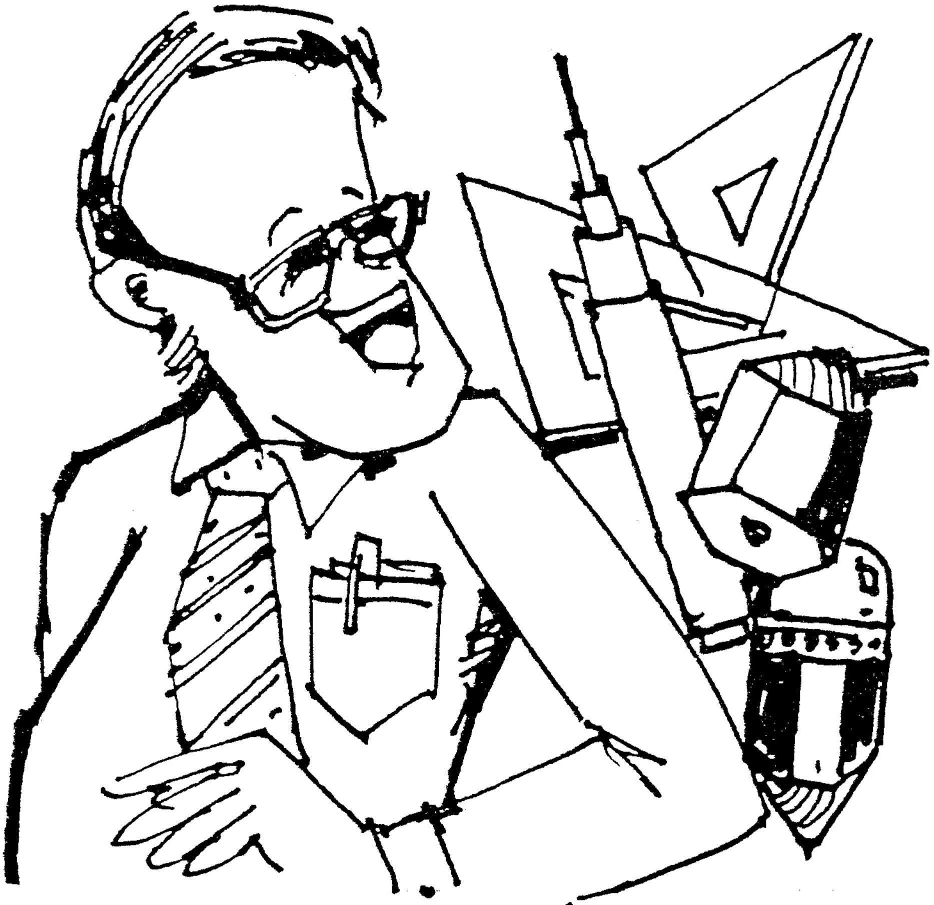
Service Manual

V22319

15" Multi-Mode VGA
COLOR MONITOR

CM15 [illegible]



TATUNG

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1. PRECAUTIONS AND NOTICES

1-1 SAFETY PRECAUTIONS

1) Observe all cautions and safety related notes located inside the display cabinet and on the display chassis.

2) Operation of these displays outside the cabinet or with the cover removed, involves a shock hazard from the display power supplies. Work on the display should not be attempted by anyone who is not thoroughly familiar with precautions necessary when working on high voltage epuipment.

3) Do not install, remove or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept away while handling picture tube. Keep picture tube away from the body while handling.

4) The picture tube is constructed to limit X-RADIATION to 0.5 mR/HR at 300 microamperes anode current. For continued protection, use the recommended replacement tube only, and adjust the voltages so that the designated maximum rating at the anode will not be exceeded.

5) Before returning a serviced display to the customer, a thorough safety test must be performed to verify that the display is safe to cperate without danger or shock. Always perform an AC leakage current check on the exposed metallic parts of the cabinet. Proceed as follows:

Connect the monitor power lead to the mains supply, via an isolation transformer, and switch on. Using the test circuit shown in Fig. 1-1, measure the AC leakage current between each pole (L and N) of the supply and all accesible metal parts. The earth leakage current must not exceed 3.5 mA.

1-2 PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this chassis provide special visual safety protection. The protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc.

Before replacing any of these components, read the parts list in the manual carefully. The use of substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire, X-RAY radiation or other hazards.

1-3 SERVICE NOTES

1) When replacing parts or circuit boards, wrap the wires around terminals before soldering.

2) When replacing a high wattage resistor (more than 1/2W) on a circuit board, Keep the resistor about 10mm (1/2 in.) away from circuit board.

3) Keep wires away from high voltage or high temperature components.

4) Keep wires in their original position so as to reduce interference.

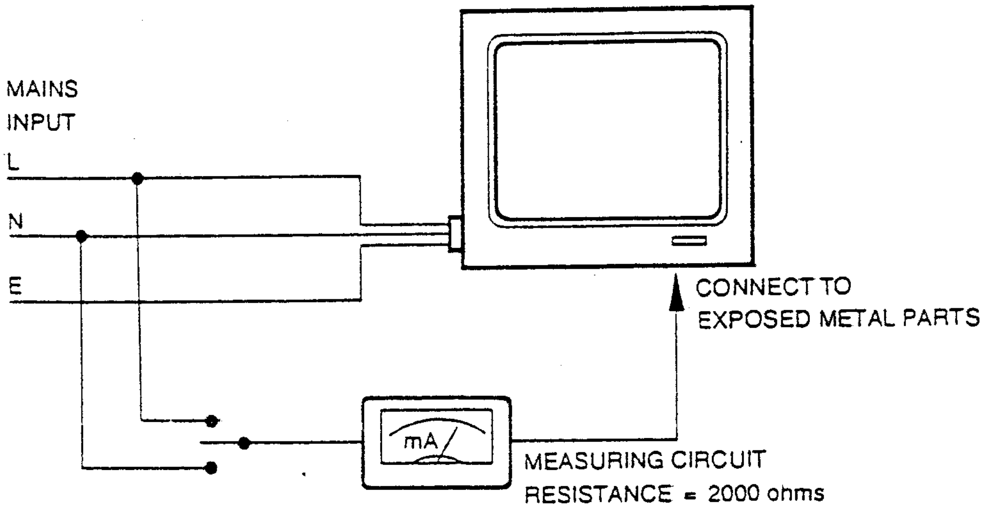


Fig. 1-1 AC Leakage Current Test Circuit.

2. SPECIFICATIONS

2-1 APPLICATION

Typical data and graphic display device for personal computer applications.

2-2 POWER INPUT

Input Voltage: AC100~240V, auto sense.
Input Frequency: 47~63Hz
Power Consumption: 85W Maximum

2-3 VIDEO SIGNALS

Video: Analog 0.7 Vp-p, Positive
Separate Sync.: TTL Level

2-4 SYNC. SIGNALS

Mode	Adapter Card	KHz Fh (Polarity)	Hz Fv (Polariy)	Display Resolution	Dot Freq. (MHZ)
1	VGA	31.468 (+)	70.000 (–)	640x350	25.175
2	VGA	31.468 (–)	70.000 (+)	720x400	28.321
3	VGA	31.469 (–)	59.940 (–)	640x480	25.175
4	SVGA	35.156 (+/–)	56.250 (+/–)	800x600	36.000
5	8514/A	35.520 (+)	86.960 (+)	1024x768	45.060
6	VESA VGA	37.860 (–)	72.809 (–)	640x480	31.501
7	VESA SVGA	37.879 (+/–)	60.317 (+/–)	800x600	40.000
8	VESA SVGA	48.077 (+)	72.187 (+)	800x600	50.000
9	UVGA	48.363 (+/–)	60.000 (+/–)	1024x768	65.000
10	EVGA	56.476 (+/–)	70.069 (+/–)	1024x768	75.000

2-5 SIGNAL CONNECTOR

15-Pin mini D-sub male connector

2-6 DISPLAY TUBE

15" 90° deflection, 0.28 mm dot pitch

2-7 ACTIVE DIPSLAY AREA

Horizontal: 260 mm typical
(varies by signal timing)
Vertical: 195 mm typical
(varies by signal timing)

2-8 DISPLAY COLORS

Analog Input: Infinite colors
(262, 144 color range)

2-9 MISCONVERGENCE

Center: 0.3 mm Maximum
Corner: 0.5 mm Maximum

2-10 ENVIRONMENTAL CONDITIONS

Operating Temperature: +5°C ~ +35°C
Operating Humidity: 10% ~ 80%
(non-condensing)
Storage Temperature: –40°C ~ +65°C
Storage Humidity: 5% ~ 95%

2-11 USER CONTROLS

Power switch, Brightness, Contrast, Preset Recall, +, –, function select (Horizontal width, Horizontal phase Vertical height, Vertical position), Zoom, Preset save.

2-12 DIMENSIONS (W)x(H)x(D)

370mmx342.5mmx380mm (w/o Base)

2-13 TILT/SWIVEL BASE

Height: 28mm
Tilt Range: + 15°/– 5°
Swivel Range: +/– 45°

2-14 WEIGHT (NET)

12.4 Kg

2-15 SAFETY SPECIFICATIONS

UL, CSA, FCC CLASS B
TÜV, GS, FTZ

2-16 LOW RADIATION

ITEM	MPR II specifications	CM15VDS	PB8515SV CM15VDE LR5A*	CM15VDR
X-ray radiation	<100nGy/h	<100nGy/h	<100nGy/h	<100nGy/h
Electrostatic potential	<±500V			<±500V
Alternating electric field Band I (5Hz-2kHz) Band II (2kHz-400kHz)	<25V/m <2.5V/m			<25V/m <2.5V/m
Magnetic field Band I (5Hz-2kHz) Band II (2kHz-400kHz)	<250nT <25nT		<250nT <25nT	<250nT <25nT

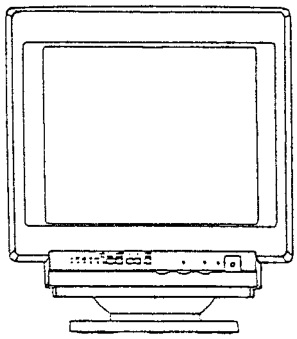
Note: Specifications subject to change without notice.

3. CONTROL LOCATIONS AND FUNCTIONS

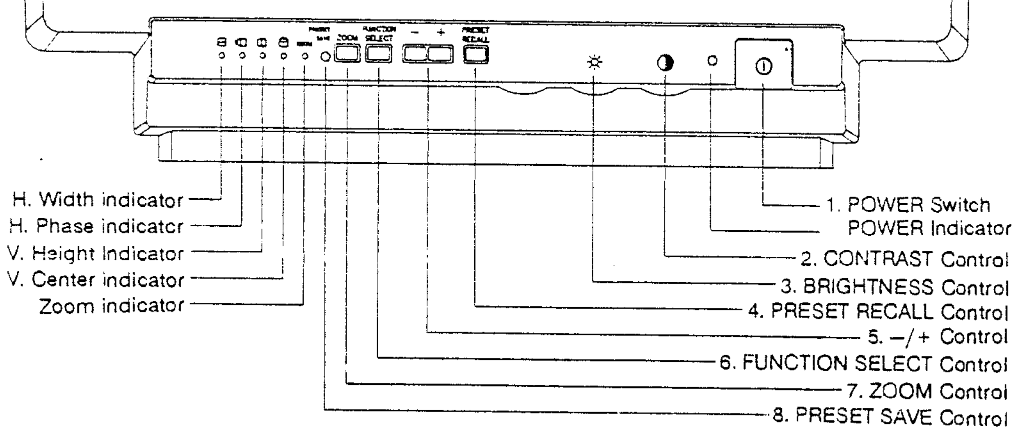
3-1 CONTROL LOCATIONS

Note: The numbers indicate the control item whose description is found on the following page.

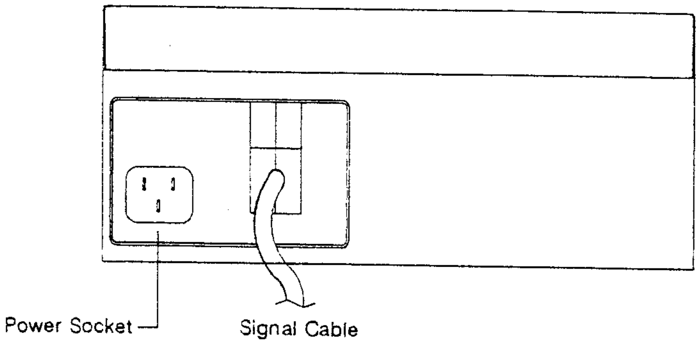
FRONT



Front User Controls


H. Width indicator
H. Phase indicator
V. Height Indicator
V. Center indicator
Zoom indicator
1. POWER Switch
POWER Indicator
2. CONTRAST Control
3. BRIGHTNESS Control
4. PRESET RECALL Control
5. –/+ Control
6. FUNCTION SELECT Control
7. ZOOM Control
8. PRESET SAVE Control
PRESET SAVE
ZOOM
FUNCTION SELECT
–
+
PRESET RECALL

REAR


Power Socket
Signal Cable

3-2 Adjustments

1. POWER Switch	Push to turn the display on, and push again to turn off. The power indicator will light when the display is on.
2. CONTRAST Control	Adjust the display to the desired contrast level.
3. BRIGHTNESS Control	Adjust the display to the desired brightness level.
4. PRESET RECALL Control	Recall the factory preset data settings.
5. –/+ Control	Adjust the dimension and center of display area to individual preference. To decrease the data setting, press the "–" button. The LED indicators will flicker from right to left. To increase the data setting, press the "+" button. The LED indicators will flicker from left to right. Be sure to press the "FUNCTION SELECT" button before the "–/+" adjustment.
6. FUNCTION SELECT Control	Selet the adjust function of display dimension and center. Press the "FUNCTION SELECT" button and release the button when the desired function LED indicator is lighted. When the "FUNCTION SELECT" button is pressed, the LED function indicators will be lighted circularly as following →H. Width→H. Phase→V. Height→V. Center→
7. ZOOM Control	Swap the NORMAL and ZOOM display.
8. PRESET SAVE Control	Change the factory data settings. Press "PRESET SAVE" button when one of H. Width, H. Phase, V. Height, V. Center indicators is lighted.

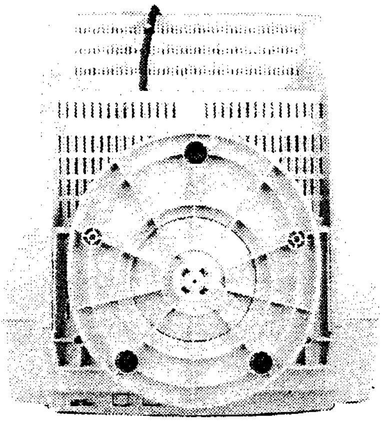
4. MECHANICAL PARTS

Ckt No.	Tatung Part No.	Description
M1	5642255700	FRONT COVER
M2	5642254800	BACK COVER
M3	5641401500	T/S BASE
M4	5641401400	T/S BALL
M5	5642642900	FASTENING RING
M6	5642802200	ON/OFF BUTTON
M7	5644210501	COMPRESSION SPRING
M8	5642659500	LIGHT TUBE
M9	5642830100	TACT SWITCH
M10	5642620900	LIGHT TUBE
M11	5648201100	MAIN CHASSIS FRAME
M12	5640525400	KNOB/ V/R
M13	5642703100	PCB HOLDER
M14	5642612300	LED HOLDER
M15	5646204500	DRIVER CARD SHIELD

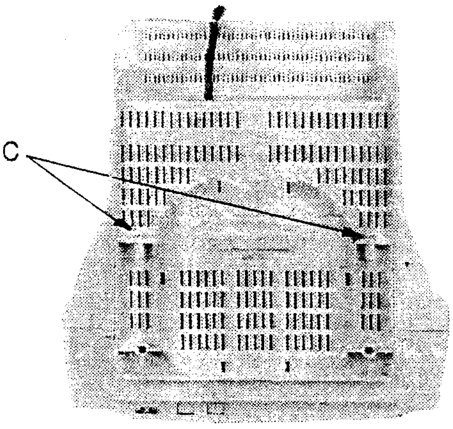
Ckt No.	Tatung Part No.	Description
M16	5646405001	HEAT SINK
M17	5646404900	HEAT SINK
M18	5646405000	HEAT SINK
M19	5646404901	HEAT SINK
M20	5646405200	HEAT SINK
M21	5646433002	HEAT SINK
M22	5646413800	HEAT SINK
M23	5642018201	SPONGE
M24	5648002600	CLAMP, SINGAL CABLE
B1	7165333582	SCREW (PZP+CW M5X30)
B2	7134251982	SCREW (PZP M4X14)
B3	7001261112	SCREW (ISO PP M4X8)
B4	7000305022	SCREW (BTBW M3X10)
B5	7134161452	SCREW (PZS M3X10)

DISASSEMBLY INSTRUCTIONS

1. SWIVEL BASE REMOVAL
   First press the stopper. Then slide the swivel ball down and remove it. (Fig. 4-1. 4-2)
2. Press 4 claw stoppers (A) to remove the fastening ring (B) and ther separate the swivel ball and swirel base. (Fig. 4-2)

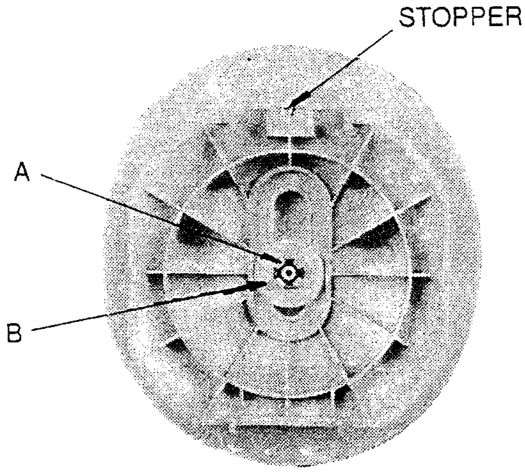


(Fig. 4-1)

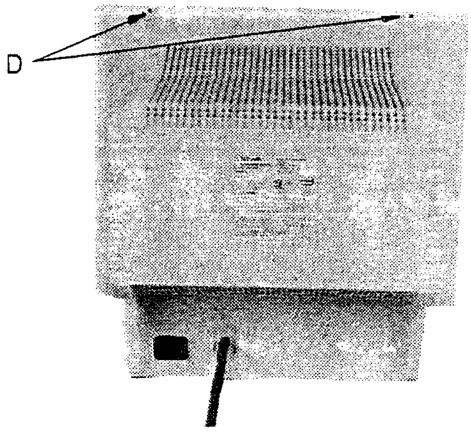


(Fig. 4-3)

3. BACK COVER REMOVAL
   a) Remove 2 screws (C) from the bottom of back cover (Fig. 4-3)
   b) Insert a small screw driver to (D) holes (Fig. 4-4) and press down two stoppers (E) (Fig. 4-5)
   c) Remove the back cover.



(Fig. 4-2)



(Fig. 4-4)

4. PCB ASSEMBLY REMOVAL

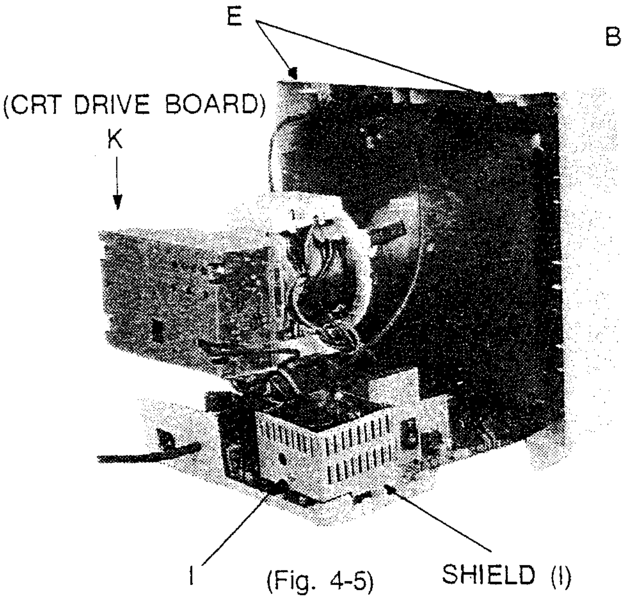
Caution: When serving or replacing the CRT. Disconnect the anode and discharge the anode completely. As high voltage (23.5KV) may remain on the anode for an extended time after power off.

a) Unplug the DY connector, AC connector, Degaussing coil connector and CRT grouding connector from the main board.
b) Discharge the remaining static electricity by shorting between CRT anode and ground.
c) Remove a screw (I) (Fig. 4-5) and another one (J) (Fig. 4-7) and then take away the shield (I).
d) Unsolder two points (F) and then remove the shield (II) (Fig. 4-6)
e) The shield (I) and shield (II) are just for MPR II model used only.
f) Remove CRT drive board (K) from CRT neck. (Fig. 4-5)
g) Release 1 claw stopper (L) from the bottom of front cover and remove the main chassis. (Fig. 4-6)
h) Remove 1 screw (M) and release 2 claw stoppers (N) from bracket main chassis to remove the PCB main board. (Fig. 4-7)

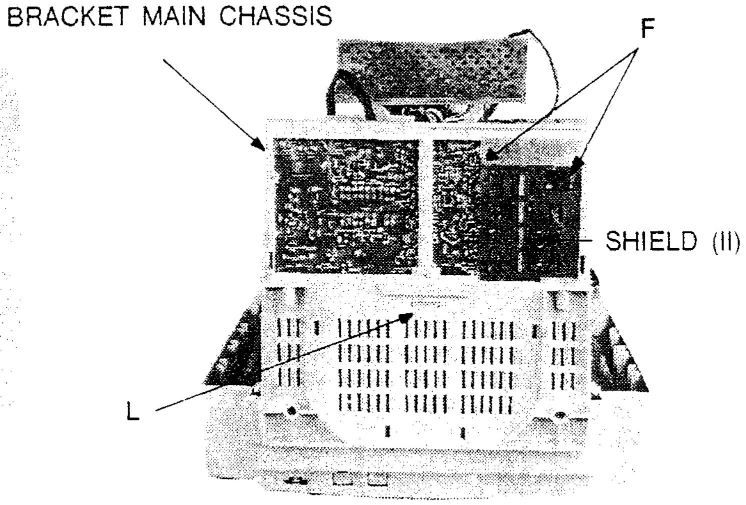
5. CRT REMOBEL (Fig. 4-8)

a) CRT is supplied as ITC.
b) Remove 4 screws (O) from the front cover to move the CRT.

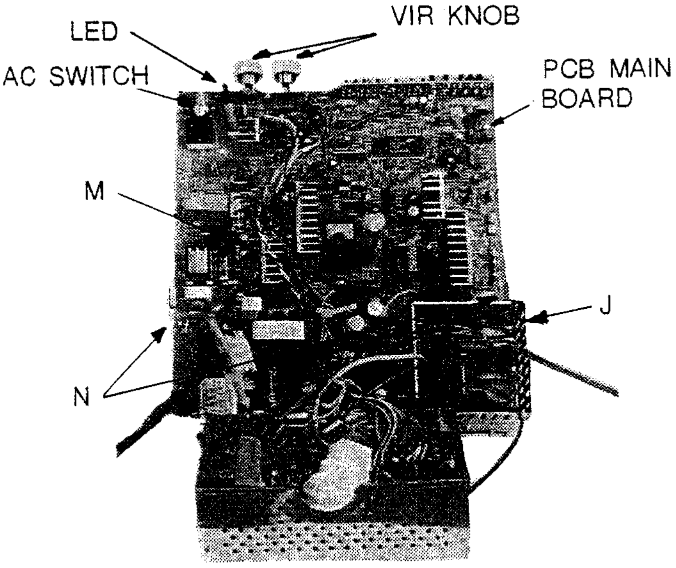
CAUTION: Do not lift the CRT by the neck.


E
(CRT DRIVE BOARD)
K
I
SHIELD (I)

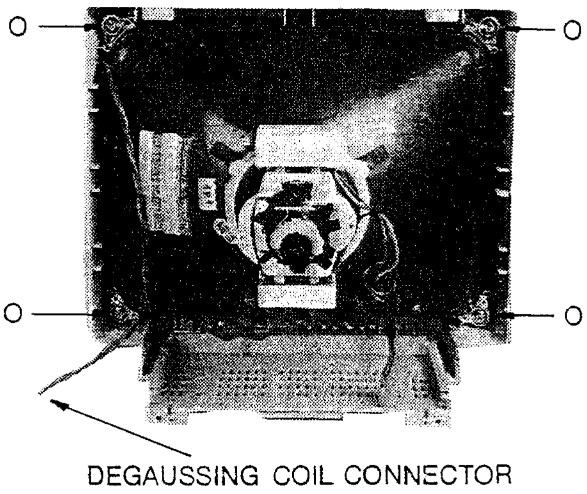
(Fig. 4-5)


BRACKET MAIN CHASSIS
F
SHIELD (II)
L

(Fig. 4-6)


LED
VIR KNOB
AC SWITCH
PCB MAIN BOARD
M
J
N

(Fig. 4-7)


O
O
O
O
DEGAUSSING COIL CONNECTOR

(Fig. 4-8)

5. GENERAL CONNECTION & APPLICATIONS

Your monitor has two connection cables:

1. A Power Cord, which connects directly to a grounded AC outlet or to a surge protector that is connected to a grounded AC outlet.

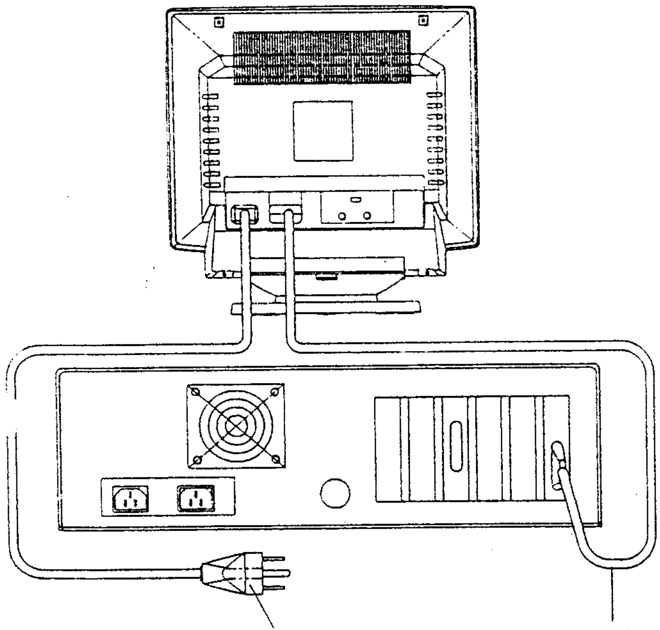
2. A Signal Cable, which connects to your computer's graphics adapter (VGA connector).

To ensure your safety when connecting the cables, always follow these four steps:

1. Make sure that the power switches on your computer and monitor are OFF. Also, make sure the power cords from both devices are unplugged.

2. Carefully connect the signal cable from the monitor to your computer's graphics adapter (VGA Connector). The signal cable's connector is shaped so that it must be properly aligned with the computer's graphics adapter (VGA Connector).

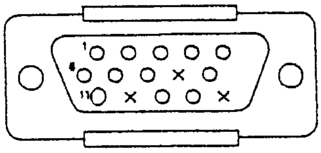
3. Secure the connection by tightening the twin screws on the signal cable connector.



4. Plug the power cords from the computer and monitor into a grounded AC outlet or a surge protector that is connected to a grounded AC outlet.

5. Pin assignments and Signal Levels

The pin assignments of the video signal cable are shown below:



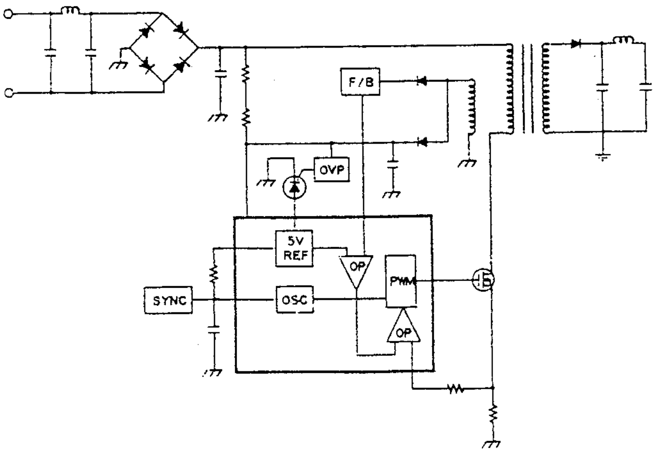
15-Pin Min D-Sub Male Connector

PIN NO.	SIGNAL
1	RED
2	GREEN
3	BLUE
4	GROUND
5	GROUND
6	R-GROUND
7	G-GROUND
8	B-GROUND
9	NO CONNECTION
10	GROUND
11	GROUND
12	NO CONNECTION
13	H-SYNC.
14	V-SYNC.
15	NO CONNECTION

6. ELECTRONIC CIRCUIT DESCRIPTION

6-1 SWITCHING MODE POWER SUPPLY

1. CIRCUIT DIAGRAM



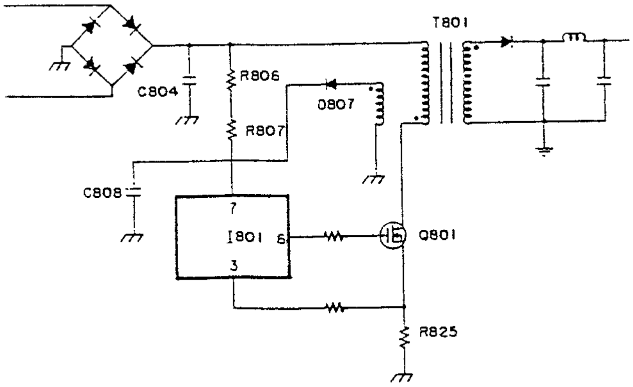
2. CIRCUIT DESCRIPTION

A. AC Input Circuit

The power supply operates at full-range which input range from 100V to 240V, without any voltage selector switch.

B. Start Circuit

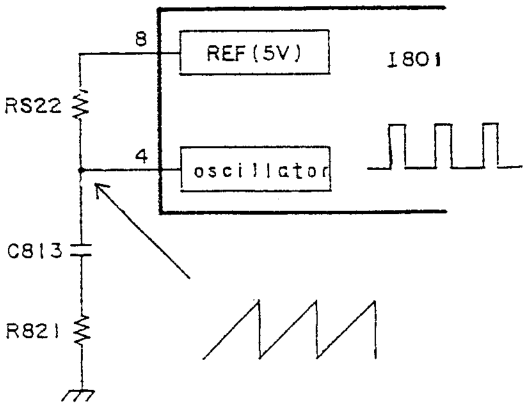
Prior to starting a low current drained from C804 via R806, R807 to pin 7 of I801, it charges C808 when the voltage of C808 reach 16V. The I801 operates immediately and Q801 turns on, a primary current flow through the primary winding of T801 and energy store in the primary winding during Q801 turns off, the energy transfer to the secondary winding, the auxiliary winding is well coupled and in phase with the secondary winding, it will provide voltage on C808 and feed to pin 7 of I801, the voltage of C808 must be over 10V, to keep I801 working.



C. Sawtooth Oscillator Circuit

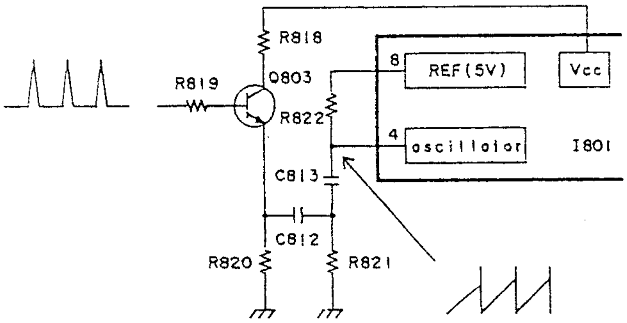
The free running frequency of oscillator is around 30KHZ, it is determined by the timing components of R822 and C813.
C313 is charged to 2.8V from the reference voltage (pin 3 of I801) through R822 and discharged to 1.2V.

During the discharge interval, the oscillator generates a series of blanking pulse that causes the pin 6 of I301 to low states.



D. SYNCHRONIZATION

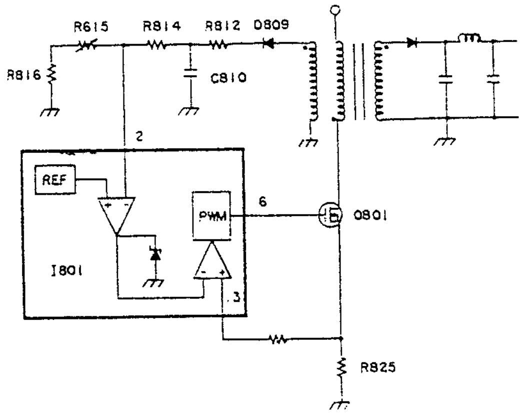
The oscillating frequency can be synchronized by pulse coupled from flyback transformer of horizontal circuit. The pulse provides a basic current to drive on Q803 and collector current of Q803 flows to R818 and R820, the needle pulse is fed to pin 4 of I801, via C812, R821 and C813. So the voltage of C813 is forced to discharge early. This operation makes oscillating frequency in phase with the horizontal frequency.



E. PULSE WIDTH CONTROL

The primary auxiliary winding is well-coupled and in phase with the secondary winding, it supplies the power to pin 7 of I801 and provides a negative feedback voltage via D809, R812, R814 to pin 2 of I801, the feedback voltage will compares with internal reference voltage (2.5v) and generates an error voltage to another internal one. It will be compared with the voltage drop of R825, while Q801 turns on. As the voltage of R825 reachs to the error voltage, the Q801 turns off.

Therefore the error voltage can control O801 on time pulse width against line changes and load changes.



F. PROTECTIVE CIRCUIT

The power supply has a protective circuit against overloaded and short circuit output occurred at the secondary, the voltage drop of R825 reaches 1 vp-p rapidly, it makes the power supply circuit shut down.

On abnormal condition, if the over voltage occured at auxililary winding, the zener diode D820 turns on, Q802 is trigged, and the voltage on pin 8 of I801 is clamped to low states, I801 turns off, the power supply circuit shut down.

6-2 Automatic Degaussing Circuit

Posistor R803 and degaussing coil compose an automatic degaussing circuit to demagentic the shadow mask and internal shield in the CRT.

Posistor shows low resistance value (14Ω) in normal temperature, when apply AC line voltage, big current flows into degaussing coil, only few seconds, resistance of posistor increase repidly due to rising in heat, degaussing current thus decrease to less than 100 mAp-p rapidly, degaussing functions is com-pleted.

6-3 DIGITAL CONTROL CIRCUIT

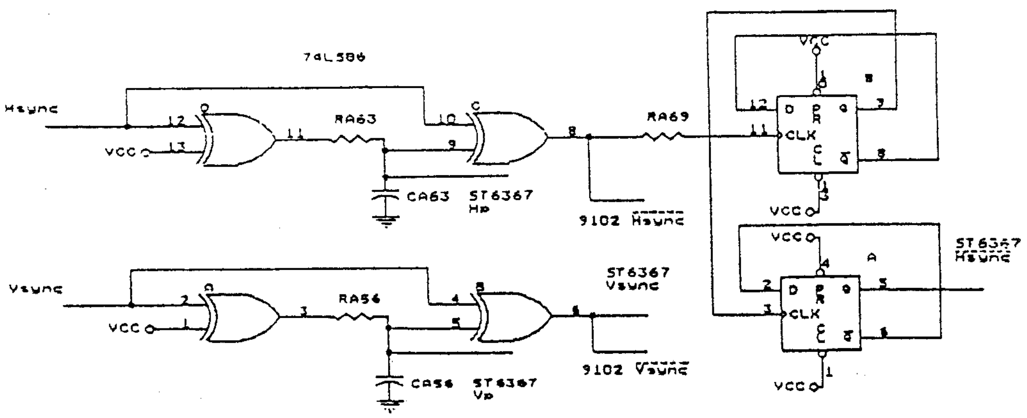
1) Sync. Processor (74LS86) and Frequency Prescalar (74LS74)

I301(TDA9102C) need to be input negative polarity sync. signal to synchronize its free-running oscillation. So we use 74LS86 to transfer either postive or negative polarity signal to negative polarity signal. It will see that

x XOR 'H' = x' , x XOR 'L' = x

Thus, we let sync. signal XOR with H then integrate the output and let sync. signal XOR with the integrated value again. The final output will absolutely be negative polarity signal.

For matching the speed of IA01 (ST6367) counter, we use 74LS74 to prescale the horizontal frequency to one fourth time before inputting IA01.



2) Digital Control Circuit with Microcontroller

The microcontroller, IA01 (ST6367), is detecting the frequency and polarity of both horizontal and vertical sync. signals. It will output the default value for every guaranteed video timing when IA01 had already confirmed.

Video Timing Chart:

Mode	Adapter Card	KHz Fh (Polarity)	Hz Fv (Polariy)	Display Resolution	Dot Freq. (MHZ)
1	VGA	31.468 (+)	70.000 (–)	640x350	25.175
2	VGA	31.468 (–)	70.000 (+)	720x400	28.321
3	VGA	31.469 (–)	59.940 (–)	640x480	25.175
4	SVGA	35.156 (+/–)	56.250 (+/–)	800x600	36.000
5	8514/A	35.520 (+)	86.960 (+)	1024x768	45.060
6	VESA VGA	37.860 (–)	72.809 (–)	640x480	31.501
7	VESA SVGA	37.879 (+/–)	60.317 (+/–)	800x600	40.000
8	VESA SVGA	48.077 (+)	72.187 (+)	800x600	50.000
9	UVGA	48.363 (+/–)	60.000 (+/–)	1024x768	65.000
10	EVGA	56.476 (+/–)	70.069 (+/–)	1024x768	75.000

Table 6-3.1

Microcontroller Default Output:

Mode	FH2	FH3	FH4	FH5	FV1	FV2	FV3	B+	C417	C418	C438	L402	L403
1.	L	L	L	L	H	H	L	75					X
2.	L	L	L	L	L	H	L	75					X
3.	L	L	L	L	L	L	L	75					X
4.	L	L	L	H	L	L	L	75		X			X
5.	L	L	H	L	H	L	L	75		X			X
6.	L	H	L	L	H	H	L	105	X	X			
7.	L	L	L	H	L	L	H	75		X			X
8.	L	H	L	L	L	H	H	105	X	X			
9.	H	L	L	L	H	H	H	130	X	X			
10.	L	L	H	L	L	H	L	75		X			X

Table 6-3.2

3) Power Saving Control Circuit (optional)

Out of vertical sync. signal, the timer 555 without varying signal to trigger will output low. Through the MC14551BCP controlling, I301 pin6 (H.out) will be pulled down to 0.2v nearby and the path from 6.3V to heater is opened. It also forces the B+ to 75V at any mode.

6-4 Horizontal Deflection Circuit

1) Horizontal oscillator

For synchronization, a horizontal sync pulse, which must be negative edge triggered and TTL compatible, should be input into the pin 4 of I301 (TDA9102C).

The frequency of horizontal oscillator is determined by C403 and its charging and discharging current which is proportional to the current flowing through the R403A. Because the voltage at pin 1 of I301 is fixed at 3.5V, the frequency of horizontal oscillator can be as same as horizontal sync pulse by controlling the voltage across R403A. The operation of controlling the voltage across R403A is performed by the freguency-to-voltage converter that is one function provided by microcontroller IA01 (ST6367) associated with QA34 and QA35. The microcontroller recognizes the frequency of signal at pin 35, a square waveform which frequency is one fourth of horizontal sync pulse, then outputs a PWM signal at pin 34. The PWM signal will be converted to dc voltage, controlling the horizontal oscillating frequency, by a low pass filter and a level shifting circuit. The low pass filter is composed of RA34 and CA34, and the level shifting circuit is composed of QA34 and QA35 (Fig. 1).

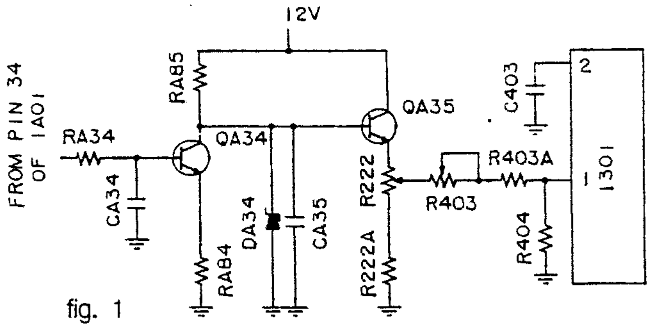


fig. 1

2) Horizontal phase adjustment

The horizontal phase can be adjusted by changing the voltage at pin 10 of I301. For recovering the deflection delay of line output transistor, the flyback pulse should be input to the pin 8 of I301.

3) Horizontal Deflection Output Circuit

The horizontal output pulse at pin 6 of I301 is amplified by Q402 and coupled by T401 to the horizontal output transistor Q403 for on-off control, thus sawtooth waveform current through the horizontal deflection yoke is obtained (Fig. 2).

4) Horizontal C-Correction and S-Correction

The function of C-correction is to correct the asymmetrical non-linearity of picture, and S-correction is to correct the symmetrical non-linear distortion of equidistant lines. L403, L402, and horizontal yoke are in series for C-correction if the horizontal frequency is larger than 48KHz, otherwise only L403 and horizontal yoke are in series. RL401 and Q419 operate together for switching L402. C417, C418, and C438 are for S-correction, besides they also are supply capacitors which can supply the voltage for yoke. If horizontal frequency is larger than 48KHz, only C438 is in action. When frequency between 35KHz and 48Khz, C438 and C417 are in parellel. Once the mode is VGA mode, three capacitors all are in parallel. Q417 and Q418 operate as switches for C417 and C418 (Fig. 2).

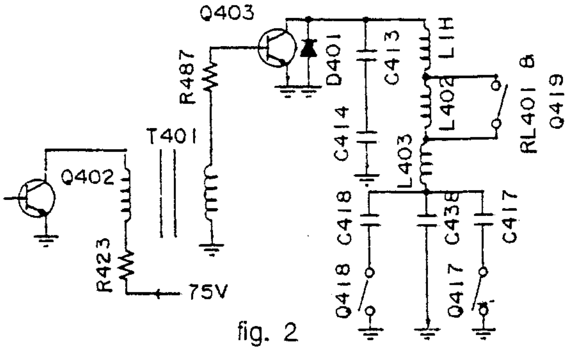


fig. 2

5) Width Control

The wide control consists of Q405, Q404, and an op-amp (packaged in I403). The operation is to limit the peak scanning current of horizontal yoke by regulating supply voltage obtained at the collector of Q405. The op-amp is responsible for detecting the error voltage between its two inputs caused by width adjustment, then Q404 amplifies the error and changes the collector voltage of Q405 (Fig. 3).

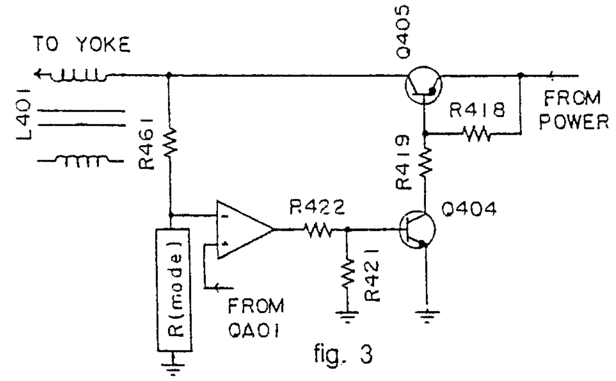

TO YOKE
L401
R461
Q405
R418
FROM POWER
R419
R422
Q404
R(mode)
FROM QA01
R421

fig. 3

6) Pincushion Correction Circuit

The pincushion correction circuit consists of two op-amp (packaged in I403) and I404. In order to generate the parabolic waveform needed for pincushion correction, the two op-amp construct an active integrator for integrating the vertical sawtooth waveform from R326. And I404 functions as a switch depending on vertical frequency, it can adjusts the amplitude of the parabolic waveform as properly as possible (Fig. 4).

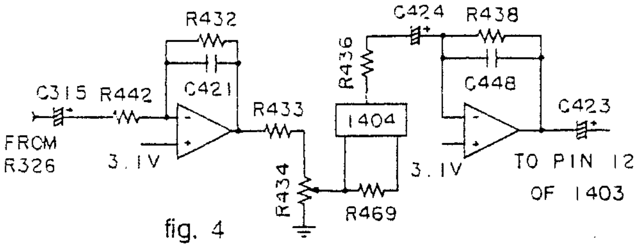

R432
C315
R442
C421
FROM R326
3.1V
R433
R434
R436
C424
R438
C448
I404
R469
3.1V
C423
TO PIN 12 OF I403

fig. 4

6-5 vertical deflection circuit

1) Vertical Oscillator

The vertical sync. which has transformed to negative pulse by IA02 is applied on pin 14 of I301, R303, R304, C306 connected to pin 12 and pin 13 determine the frequency of the oscillator inside I301 (Fig. 5).

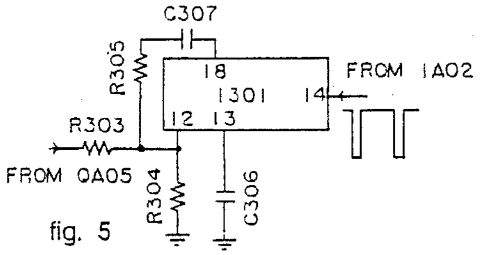

C307
R305
18
I301
14
12
13
FROM IA02
R303
FROM QA05
R304
C306

fig. 5

2) Vertical Height Control

The pin 15 of I301 is the output of vertical oscillator. It outputs a sawtooth waveform, which is the input of vertical deflection output circuit I303, and the amplitude depends on the dc voltage applied on pin 16.

3) Vertical Linearity Control

I301 generates a "M" waveform on pin 18. This signal will adjust the sawtooth waveform on pin 12 through an feedback resistor R305 in series to C307 for S-correction, and its amplitude depends on the dc voltage on pin 17.

4) Vertical Deflection Output Circuit

I303 is the key component of vertical deflection output circuit. R333, R331, R308, C311, and C310 function as ac feedback network for C-correction. D301 and C317 works for generating flyback pulse (Fig. 6).

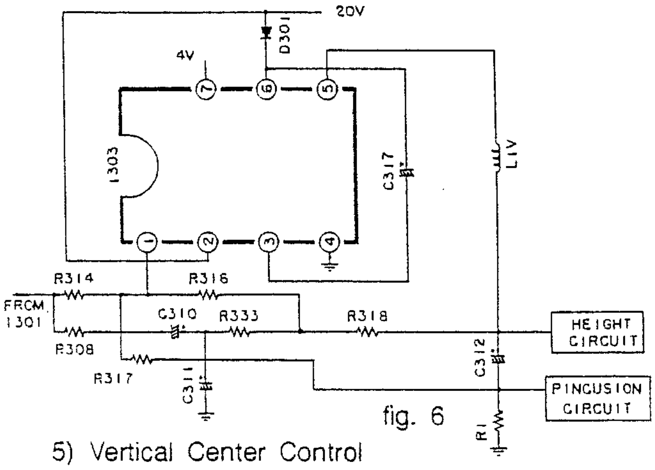

20V
D301
4V
7
6
5
I303
C317
L1V
1
2
3
4
R314
R316
FROM I301
C310
R333
R318
HEIGHT CIRCUIT
R308
R317
C311
C312
PINCUSION CIRCUIT
R1

fig. 6

5) Vertical Center Control

IA04, QA31, and QA32 constructs the circuit controlling the vertical position of the picture. The controlling method is to adjust dc current flowing the vertical yoke (Fig. 7).

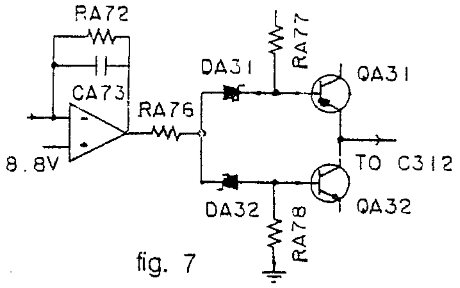

RA72
CA73
RA77
DA31
QA31
RA76
8.8V
TO C312
DA32
QA32
RA78

fig. 7

6-6 High Voltage Generating Circuit

The output signal from pin 6 of I301 is also driven by Q409 and coupled by T402 to the high voltage generator stage Q410 for on-off control. During the retrace tome, a flyback pulse of about 800 voltages is produced at the collector of Q410, this pulse is transferred and rectified by the FBT (T403) to obtain a high voltage of about 23.5 KV for anode of CRT (Fig. 8).

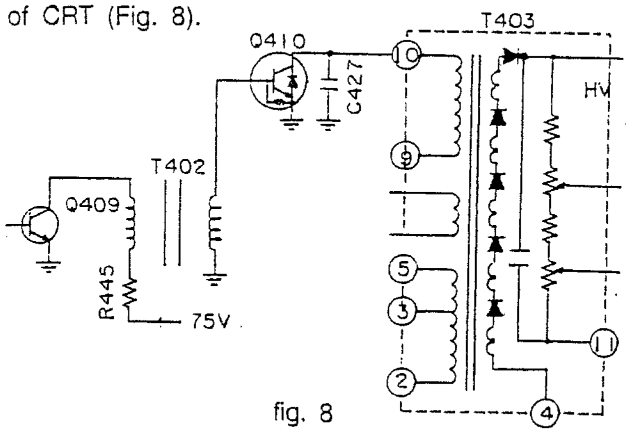

T403
Q410
C427
10
HV
9
T402
Q409
R445
75V
5
3
11
2
4

fig. 8

6-7 Video Circuit

The analog R. G. B. video input signals are supplied through the signal cable which terminates at P502, these input signals are approximately 0.7 Vp-p in amplitude.

R501/R531/R561 in parallel with R502/R532/R562 give a total resistance of 75 ohm for impedance matching. R502/R532/R562 also act as R. G. B. video gain control.

The R. G. B. video signalsare then AC coupled via C501/C531/C561 to the video pre-amplifier I501 at pin 4 pin 6 and pin 9 respectively. DC bias to the video input is through R503/R533/R563 which are connected to the 2.28V reference at pin 11 of I501.

After being pre-amplified, the R. G. B. video signals are output from pin 25, pin 20 and pin 16 of I501 respectively. Signal amplitude at these outputs are about 1.5 to 3.2 Vp-p. The DC contrast control voltage derived from R518 is applied via the emitter follower Q595 to pin 12 of I501, which varies the AC gain of all three R. G. B. channel amplifiers simultaneously. C596 added at pin 12 of I501 to prevent noise from the contrast control pot from entering the IC.

RF decoupling capacitors C581, C582, C583 are required at pin 2 and pin 3 of I501 to insure high frequency isolation between the three video amplifiers which share these common connections.

The beam current limiter circuit which is composed of Q591, Q594 and its peripheral components, automatically responds to the dynamic or static variation of beam current, thus regulating the screen brightness to prevent image distortion.

The DC brightness control voltage derived from R995 is applied to the positive input of the three gated differential clamp comparators in I501. At pin 24, pin 19 and pin 15 for black level setting. The negative input of the three gated differential clamp comparators are located at pin 26, pin 21 and pin 17 of I501.

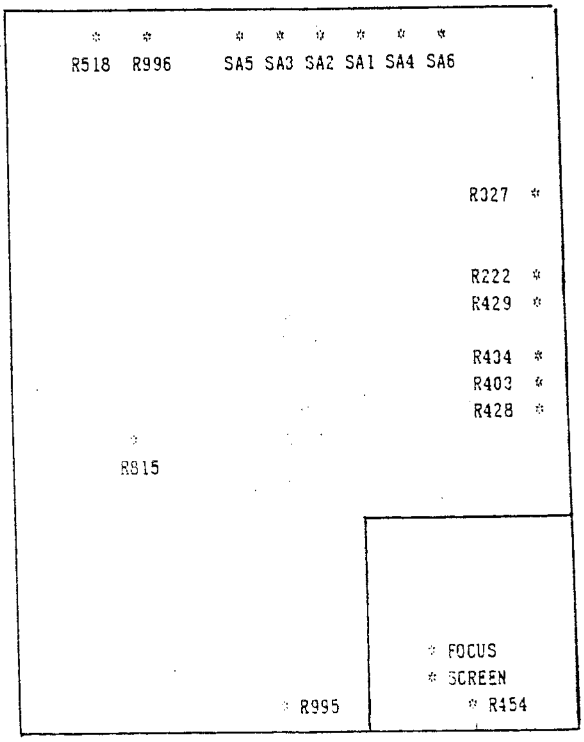
Clamping pulses derived from horizontal cutput are applied to the calp gate at pin 14 of I501. The clamp comparators, when gated on, during the reference period, will charge of discharge the clamp capacitors C502, C532, C562 at pin 5 pin 8 and pin 10, until the negative input of the clamp comparators matches the positive input voltage which is set by the brightness control, thus holding the DC bias of the video amplifiers and CRT cathodes constant during the balck level reference portion ofthe video waveform.

The video output amplifiers I901 are composed of typical cascode stages and the complementary buffer stage which matches the impedance between the cascode video amplifiers and the CRT to minimize the transimission loss. The amplifiers of I901 have a gain of 13 that is enough to drive the CRT cathodes.

The cathoe cut-off voltage settings required for white balance are achieved by adjusting R906/R936/R966. The series surge limiting resistors R909/R939/R969 for the video amplifiers wil from a low-pass-filter with the CRT capacitance, therefore offering protection against flash-over.

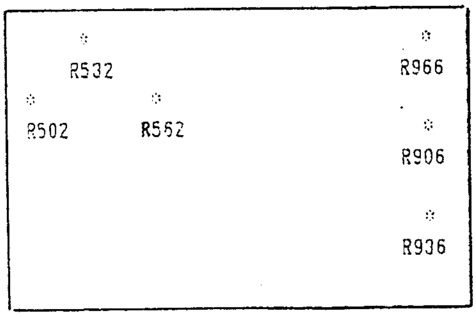
7. ADJUSTMENT

- The adjustment data with tolerance is only for setting to the optimum performance.
  Service Adjustment Control Locations MAIN BOARD (PARTS SIDE VIEW) PWB-1769



- R518 - Contrast
- R996 - Brightness
- SA5 - Preset recall
- SA3 - (+)
- SA2 - (-)
- SA1 - Select function
- SA4 - Zoom
- SA6 - Save
- R327 - V-Lin
- R222 - H-Hold1
- R429 - H-Width2
- R434 - DPC Adj.
- R403 - H-Hold2
- R428 - H-Width1
- R454 - H.V. Adj.
- R995 - SUB.Brightness
- R815 - B+ Adj.

CRT DRIVE BOARD (PARTS SIDE VIEW) PWB-1787



- R502 R.Drive
- R532 G.Drive
- R562 B.Drive
- R966 B.Cut-off
- R906 R.Cut-off
- R936 G.Cut-off

7-1 B+ Output Voltage Adjustment

a) Apply a VGA signal with full white pattern to the unit.
b) Apply 120V ac to the unit.
c) Turn the BRIGHTNESS control and CONTRAST control to maximum.
d) Adjust B+ ADJ. (R815) for the voltage across C817 is 75V +/– 1V
e) Verify that the across C822 is 104 +/– 2V
f) Verify that the across C819 is 20 +/– 2V
g) Verify that the across C818 is 6.3V +/– 0.3V

7-2 H.Hold Adjustment

a) Cut-off the horizontal sync. input by connecting a jump lead from the test pin B to ground.
b) H. Hold1 (Fh=48.36 KHz) Adjustment
  (1) Apply a VGA signal with Fh=48.36 KHz crosshatch pattern to the unit.
  (2) Adjust H-Hold1 (R222) to obtain a stable picture.
c) H. Hold2 (Fh=56.48 KHz) Adjustment
  (1) Apply a VGA signal with Fh=56.48 KHz crosshatch pattern to the unit.
  (2) Adjust H-Hold2 (R403) to obtain a stable picture.
d) Repeat step a), b)
e) Disconnect the jump lead from the test pin B.

7-3 High Voltage Adjustment

a) Apply a VGA signal with full white pattern to the unit.
b) Turn the BRIGHTNESS control and CONTRAST control to maximum.
c) Adjust H.V.ADJ.(R454) for the high voltage to be 23.5 KV .

7-4 H. Width Adjustment

a) H. Width 2 (Fh=31.47 KHz)
  (1) Apply a VGA signal with Fh=31.47 KHz 720x400 crosshatch pattern to the unit.
  (2) Adjust W. Width2 (R429) for horizontal width to be 260mm.
b) H. Width 1 (Fh=48.36 KHz)
  (1) Apply a VGA signal with Fh=48.36 KHz crosshatch pattern to the unit.
  (2) Adjust W. Width1 (R428) for horizontal width to be 260mm.

7-5 Preset Recall Control

Recall the factory preset data settings.

7-6 –/+ Control

a) Adjust the dimension and center of display area to individual preference.
b) To decrease the data setting, press the "–"

button.

c) The LED indicators will flicker from right to left.

d) To increase the data setting, press the "+" button.

e) The LED indicators will flicker from left to right.

f) Be sure to press the "FUNCTION SELECT" button before the "–/+" adjustment.

7-7 FUNOTION SELEOT Control

a) Select the adjust function of display dimension and center.

b) Press the "FUNCTION SELECT" button and release the button when the desired function LED indicator is lighted.

c) When the "FUNCTION SELECT" button is pressed, the LED function indicators will be lighted circularly as following

→H.Width→H.Phase→V.Height→V.Center—

7-8 ZOOM Oontrol

Swap the NORMAL and ZOOM display.

7-9 PRESET SAVE Oontrol (or For factory use only)

a) Change the factory data setting.

b) Press "PRESET SAVE" (or "For factory use only") button when one of H.Width, H.Phase, V.Height, V.Center indicators is lighted.

7-10 Dynamic Pincushion Correction Adjustment

a) Apply a VGA signal with Fh=31.47KHz 720x400 crosshatch pattern to the unit.

b) Adjust DPC ADJ. (R434) to correct the side pincushion for minimum geometric distortion.

7-11 V.Linearity Adjustment

a) Apply a VGA signal with Fh=31.47KHz 720x400 crosshatch pattern to the unit.

b) Adjust V.LIN. control (R327) to equalize the length of center to top edge and that of center to bottom edge.

7-12 FOOUS Adjustment

a) Apply a VGA signal with crosshatch pattern to the unit.

b) Adjust FOCUS ADJ. (on T403) to get the best overall focus.

7-13 White Balance Adjustment

a) Apply a test pattern with Fh=48.36KHz video signal cut-off to the unit

b) Turn BRIGHTNESS control and CONTRAST control to maximum.

c) Preset R. CUT-OFF (R906), G. CUT-OFF (R936), and B. CUT-OFF (R966) to the position of approximately 15 degrees clockwise.

d) Use a photo meter to set the screen center brightness to 1.0 FL by adjusting the SCREEN ADJ. (on T403)

e) Use a Color analyzer to set the color coordinate to X = 0.281 ,Y = 0.311 by adjusting the R.CUT-OFF (R906) and B. CUT-OFF (R966).

f) Repeat step d), e)

g) Apply a VGA signal with Fh=48.36KHz 50mmx50mm green square pattern to the unit.

h) Turn BRIGHTNESS control and CONTRAST control to maximum.

i) Use a Photo meter to set the screen center brightness up to 50 FL by adjusting the G. DRIVE (R532).

j) Apply a VGA signal with Fh=48.36KHz 50mm x 50mm white square pattern to the unit.

k) Turn BRIGHTNESS control by adjusting the background is disappear and use a photo meter to set the screen center brightness up to 20FL by adjusting the CONTRAST control.

l) Use a Color analyzer to set the color coordinate up to X=0.281, Y=0.311 by adjusting the R. DRIVE (R502) and B. DRIVE (R562).

7-14 Convergence Adjustment

NOTE1: For a unit with new ITC, adjustment for convergence may not be necessary.

2: Prior to adjusting for convergence, the above alignment procedures must be completed.

a) Apply a VGA signal with full-white pattern to the unit.

b) Turn BRIGHTNESS control and CONTRAST control to max.

c) Use a Photo meter to set the screen center brightness up to 20 FL by adjusting the CONTRAST control.

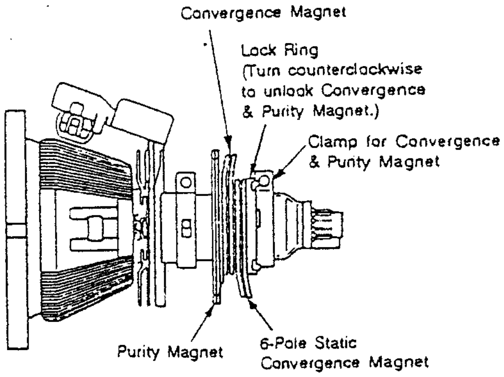
d) Apply a VGA signal with crosshatch pattern to the unit.

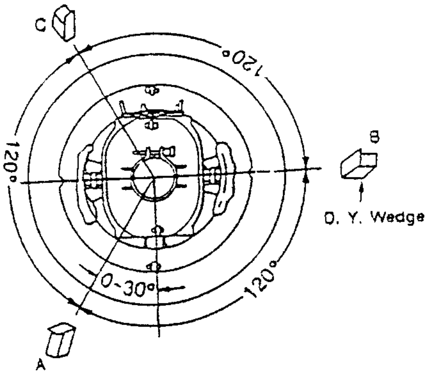
e) Loosen the convergence magnet lock ring with a screen driver.

f) Converge the red and blue lines at the center of the screen by roating the two tabs of the 4-pole static convergence magnet.

g) Align the converged red/blue lines with the green lines at the center of the screen by roating the two tabs of the 6-pole static convergence magnet.

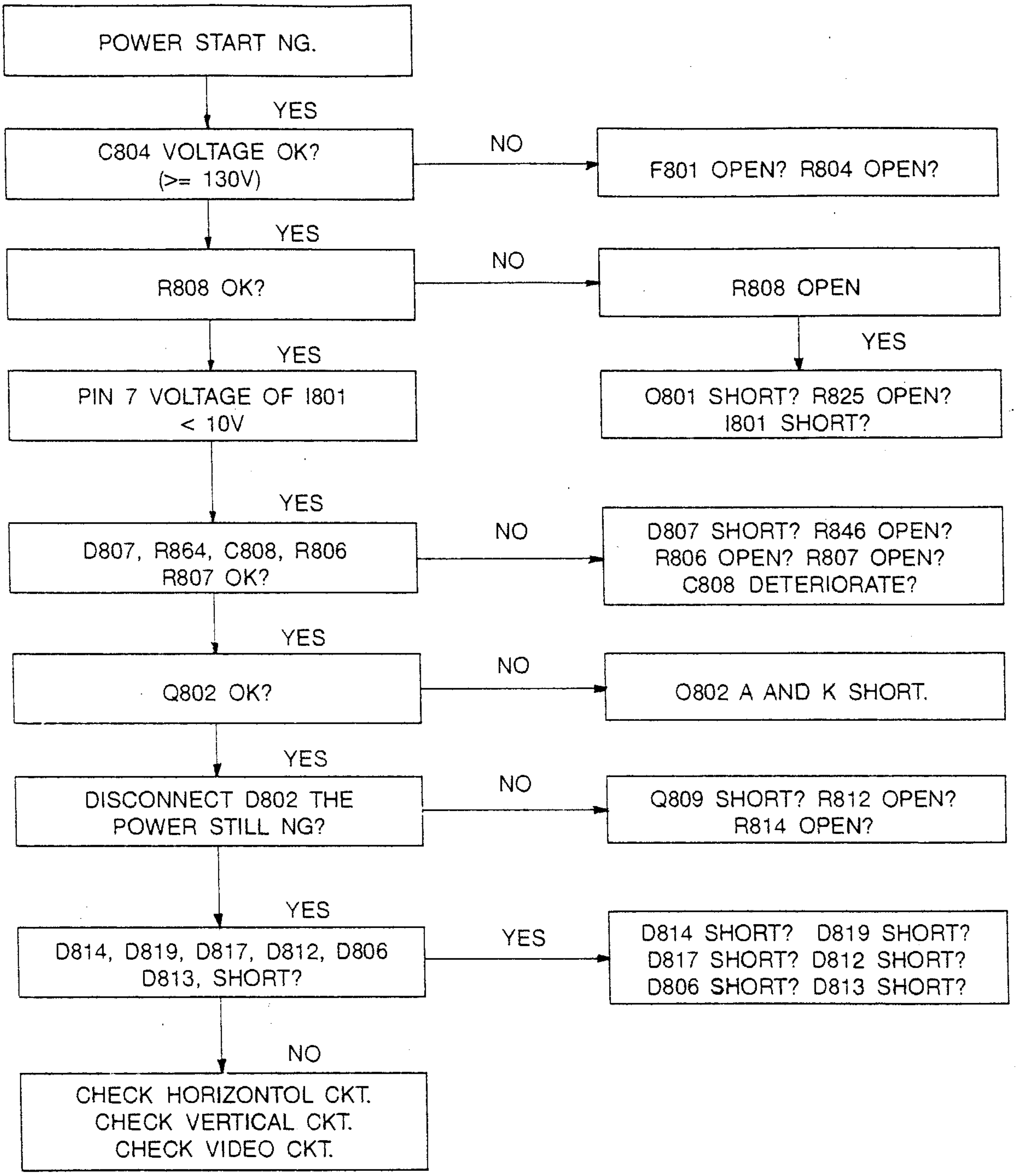
h) Tighten the convergence magnet lock ring with a screw driver.


4-Pole Static Convergence Magnet
Lock Ring (Turn counterclockwise to unlock Convergence & Purity Magnet.)
Clamp for Convergence & Purity Magnet
Purity Magnet
6-Pole Static Convergence Magnet

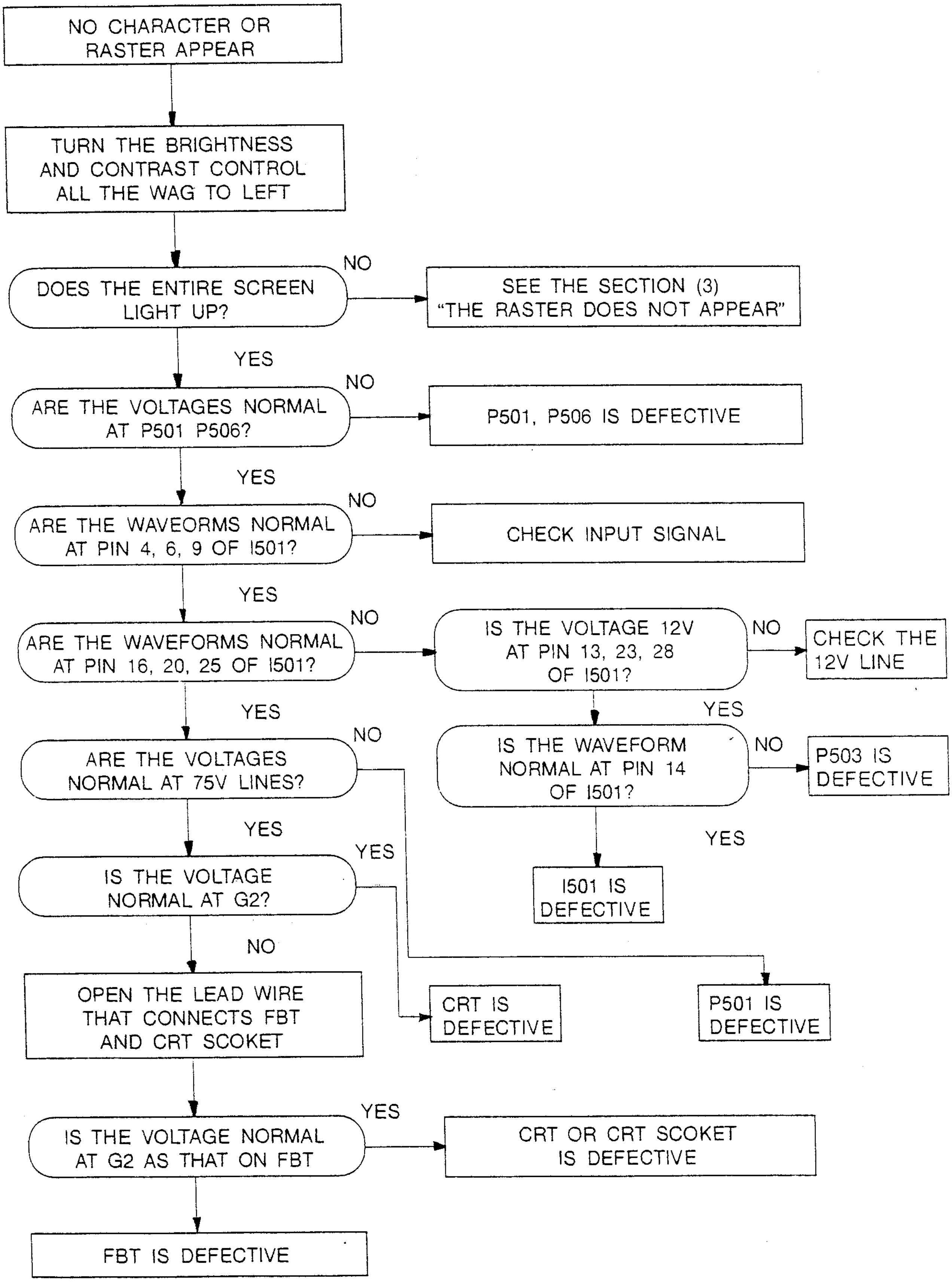


8. TROUBLESHOOTING FLOW CHART

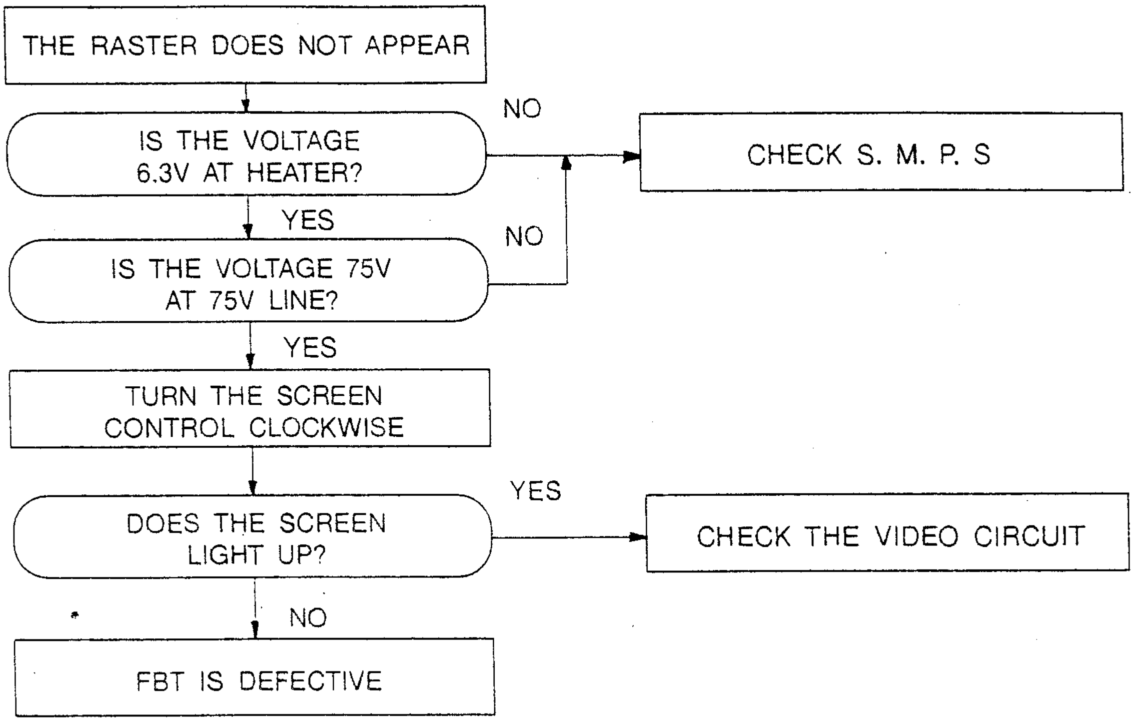
(1)


POWER START NG.
YES
C804 VOLTAGE OK?
(>= 130V)
NO
F801 OPEN? R804 OPEN?
YES
R808 OK?
NO
R808 OPEN
YES
YES
PIN 7 VOLTAGE OF I801
< 10V
O801 SHORT? R825 OPEN?
I801 SHORT?
YES
D807, R864, C808, R806
R807 OK?
NO
D807 SHORT? R846 OPEN?
R806 OPEN? R807 OPEN?
C808 DETERIORATE?
YES
Q802 OK?
NO
O802 A AND K SHORT.
YES
DISCONNECT D802 THE
POWER STILL NG?
NO
Q809 SHORT? R812 OPEN?
R814 OPEN?
YES
D814, D819, D817, D812, D806
D813, SHORT?
YES
D814 SHORT? D819 SHORT?
D817 SHORT? D812 SHORT?
D806 SHORT? D813 SHORT?
NO
CHECK HORIZONTOL CKT.
CHECK VERTICAL CKT.
CHECK VIDEO CKT.

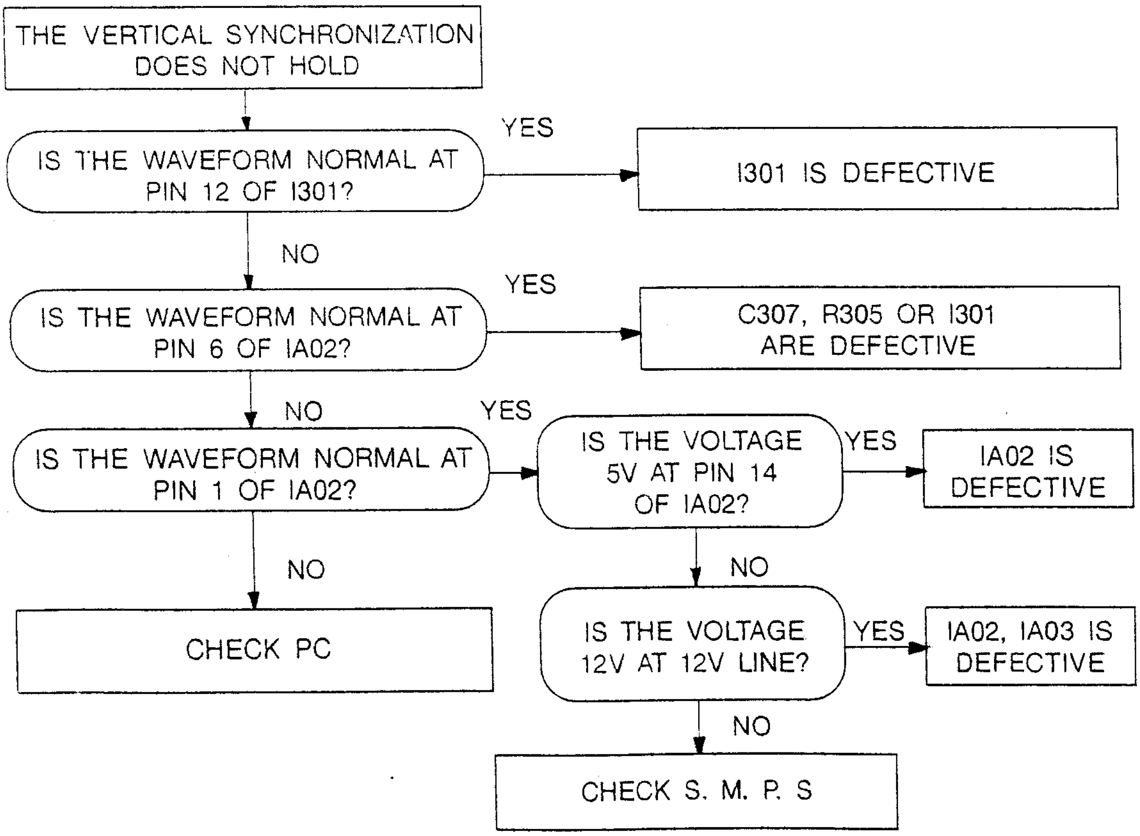
(2)


NO CHARACTER OR RASTER APPEAR
TURN THE BRIGHTNESS AND CONTRAST CONTROL ALL THE WAG TO LEFT
DOES THE ENTIRE SCREEN LIGHT UP?
NO
SEE THE SECTION (3) "THE RASTER DOES NOT APPEAR"
YES
ARE THE VOLTAGES NORMAL AT P501 P506?
NO
P501, P506 IS DEFECTIVE
YES
ARE THE WAVEORMS NORMAL AT PIN 4, 6, 9 OF I501?
NO
CHECK INPUT SIGNAL
YES
ARE THE WAVEFORMS NORMAL AT PIN 16, 20, 25 OF I501?
NO
IS THE VOLTAGE 12V AT PIN 13, 23, 28 OF I501?
NO
CHECK THE 12V LINE
YES
IS THE WAVEFORM NORMAL AT PIN 14 OF I501?
NO
P503 IS DEFECTIVE
YES
I501 IS DEFECTIVE
YES
ARE THE VOLTAGES NORMAL AT 75V LINES?
NO
P501 IS DEFECTIVE
YES
IS THE VOLTAGE NORMAL AT G2?
YES
CRT IS DEFECTIVE
NO
OPEN THE LEAD WIRE THAT CONNECTS FBT AND CRT SCOKET
IS THE VOLTAGE NORMAL AT G2 AS THAT ON FBT
YES
CRT OR CRT SCOKET IS DEFECTIVE
FBT IS DEFECTIVE

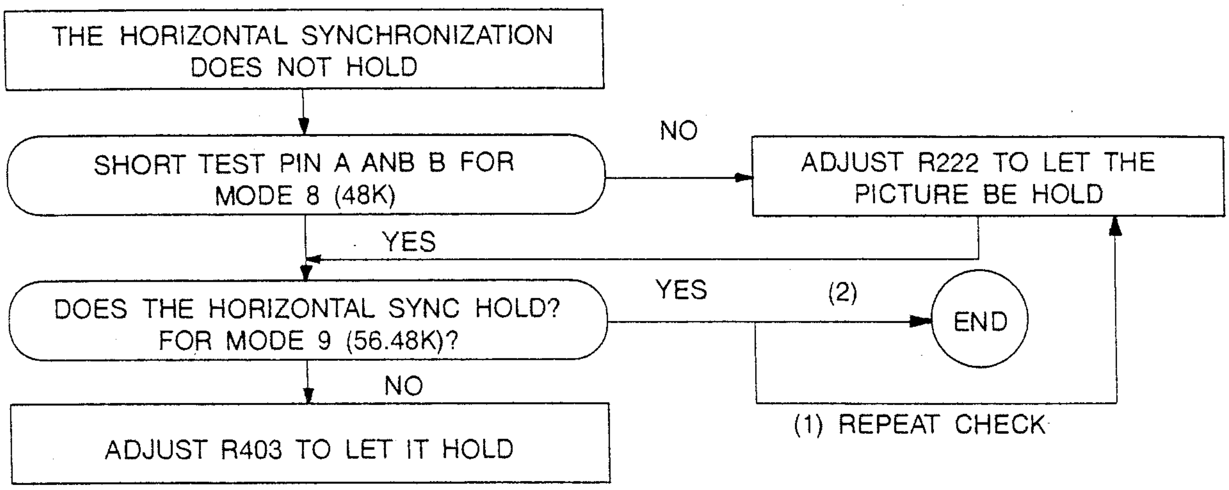
(3)


THE RASTER DOES NOT APPEAR
IS THE VOLTAGE 6.3V AT HEATER?
NO
CHECK S. M. P. S
YES
NO
IS THE VOLTAGE 75V AT 75V LINE?
YES
TURN THE SCREEN CONTROL CLOCKWISE
YES
DOES THE SCREEN LIGHT UP?
CHECK THE VIDEO CIRCUIT
NO
FBT IS DEFECTIVE

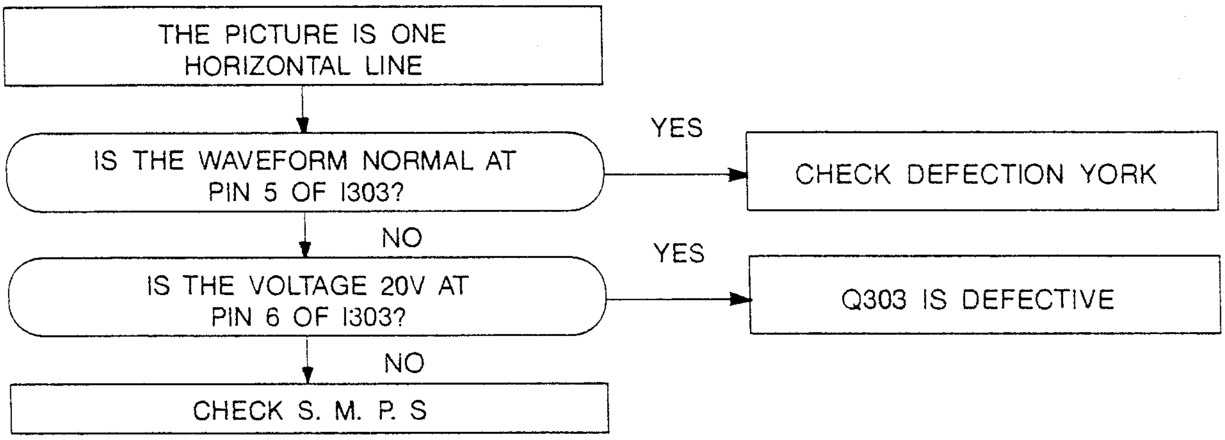
(4)


THE VERTICAL SYNCHRONIZATION DOES NOT HOLD
YES
IS THE WAVEFORM NORMAL AT PIN 12 OF I301?
I301 IS DEFECTIVE
NO
YES
IS THE WAVEFORM NORMAL AT PIN 6 OF IA02?
C307, R305 OR I301 ARE DEFECTIVE
NO
YES
IS THE WAVEFORM NORMAL AT PIN 1 OF IA02?
IS THE VOLTAGE 5V AT PIN 14 OF IA02?
YES
IA02 IS DEFECTIVE
NO
NO
CHECK PC
IS THE VOLTAGE 12V AT 12V LINE?
YES
IA02, IA03 IS DEFECTIVE
NO
CHECK S. M. P. S

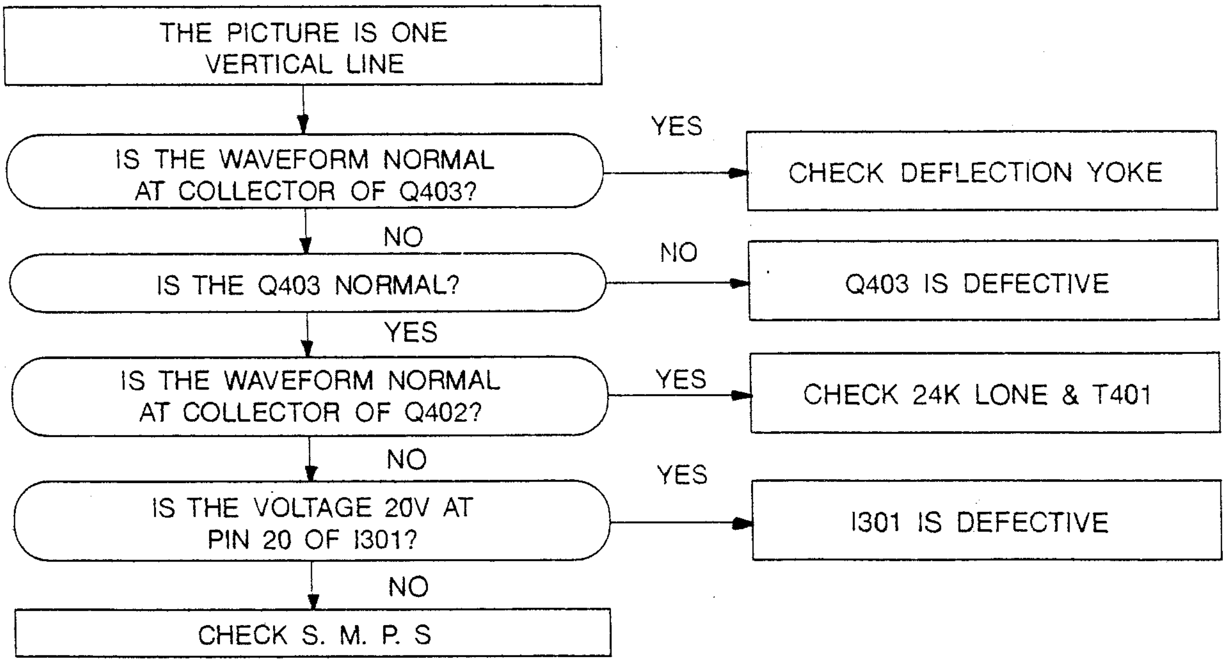
(5)


THE HORIZONTAL SYNCHRONIZATION DOES NOT HOLD
SHORT TEST PIN A ANB B FOR MODE 8 (48K)
NO
ADJUST R222 TO LET THE PICTURE BE HOLD
YES
DOES THE HORIZONTAL SYNC HOLD? FOR MODE 9 (56.48K)?
YES
(2)
END
NO
ADJUST R403 TO LET IT HOLD
(1) REPEAT CHECK

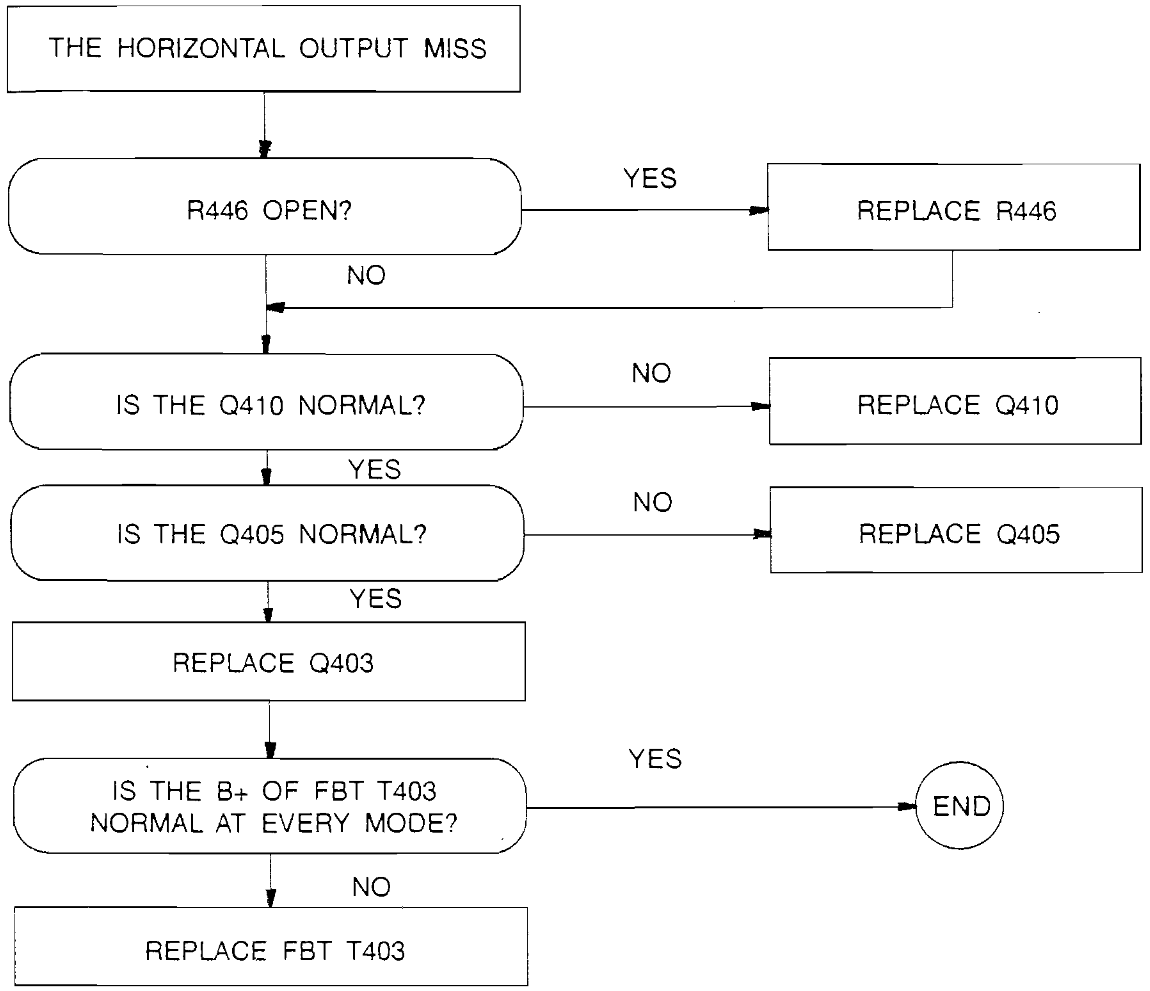
(6)


THE PICTURE IS ONE HORIZONTAL LINE
IS THE WAVEFORM NORMAL AT PIN 5 OF I303?
YES
CHECK DEFECTION YORK
NO
IS THE VOLTAGE 20V AT PIN 6 OF I303?
YES
Q303 IS DEFECTIVE
NO
CHECK S. M. P. S

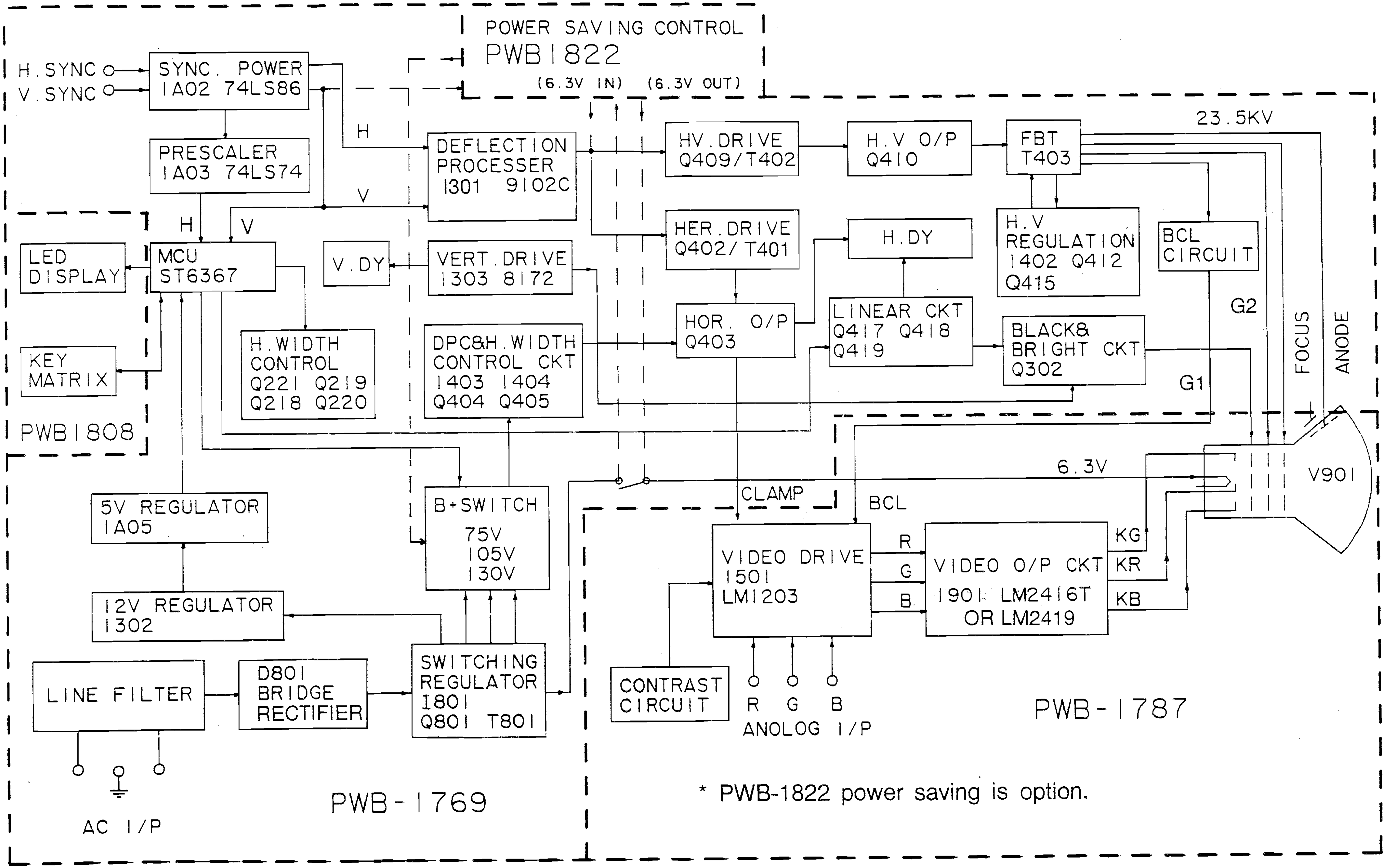
(7)


THE PICTURE IS ONE VERTICAL LINE
IS THE WAVEFORM NORMAL AT COLLECTOR OF Q403?
YES
CHECK DEFLECTION YOKE
NO
IS THE Q403 NORMAL?
NO
Q403 IS DEFECTIVE
YES
IS THE WAVEFORM NORMAL AT COLLECTOR OF Q402?
YES
CHECK 24K LONE & T401
NO
IS THE VOLTAGE 20V AT PIN 20 OF I301?
YES
I301 IS DEFECTIVE
NO
CHECK S. M. P. S

(8)


THE HORIZONTAL OUTPUT MISS
R446 OPEN?
YES
REPLACE R446
NO
IS THE Q410 NORMAL?
NO
REPLACE Q410
YES
IS THE Q405 NORMAL?
NO
REPLACE Q405
YES
REPLACE Q403
IS THE B+ OF FBT T403 NORMAL AT EVERY MODE?
YES
END
NO
REPLACE FBT T403

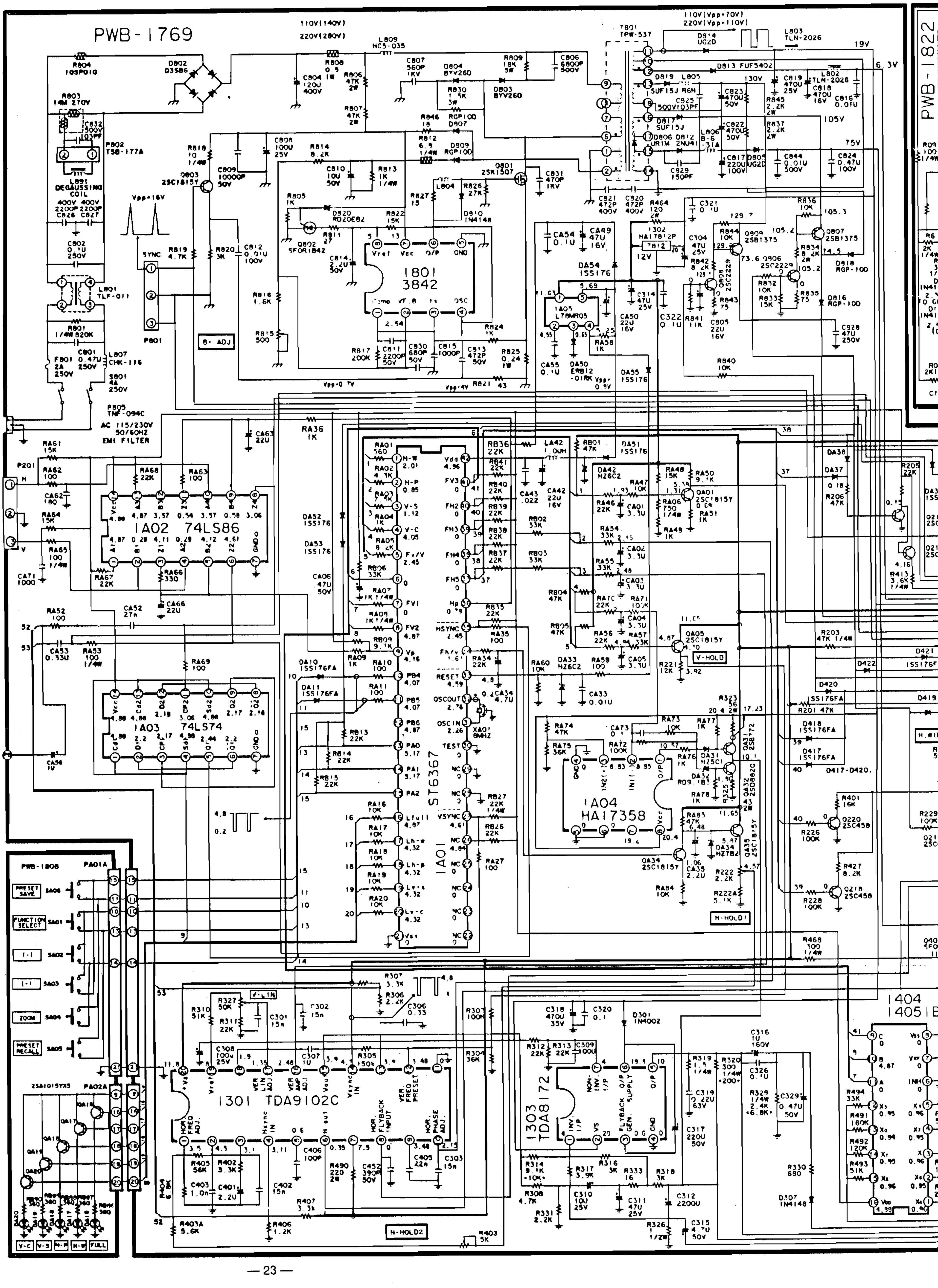
9. BLOCK DIAGRAM


POWER SAVING CONTROL
PWB1822
(6.3V IN)
(6.3V OUT)
H.SYNC
V.SYNC
SYNC. POWER
1A02 74LS86
PRESCALER
1A03 74LS74
H
V
DEFLECTION PROCESSER
1301 9102C
HV.DRIVE
Q409/T402
H.V O/P
Q410
FBT
T403
23.5KV
HER.DRIVE
Q402/T401
H.DY
H.V REGULATION
1402 Q412
Q415
BCL CIRCUIT
LED DISPLAY
MCU
ST6367
V.DY
VERT.DRIVE
1303 8172
HOR. O/P
Q403
LINEAR CKT
Q417 Q418
Q419
G2
FOCUS
ANODE
KEY MATRIX
H.WIDTH CONTROL
Q221 Q219
Q218 Q220
DPC&H.WIDTH CONTROL CKT
1403 1404
Q404 Q405
BLACK& BRIGHT CKT
Q302
G1
PWB1808
6.3V
V901
5V REGULATOR
1A05
B+SWITCH
75V
105V
130V
CLAMP
BCL
VIDEO DRIVE
1501
LM1203
R
G
B
VIDEO O/P CKT
1901 LM2416T
OR LM2419
KG
KR
KB
12V REGULATOR
1302
LINE FILTER
D801
BRIDGE
RECTIFIER
SWITCHING REGULATOR
1801
Q801 T801
CONTRAST CIRCUIT
R G B
ANOLOG I/P
PWB-1787
AC I/P
PWB-1769

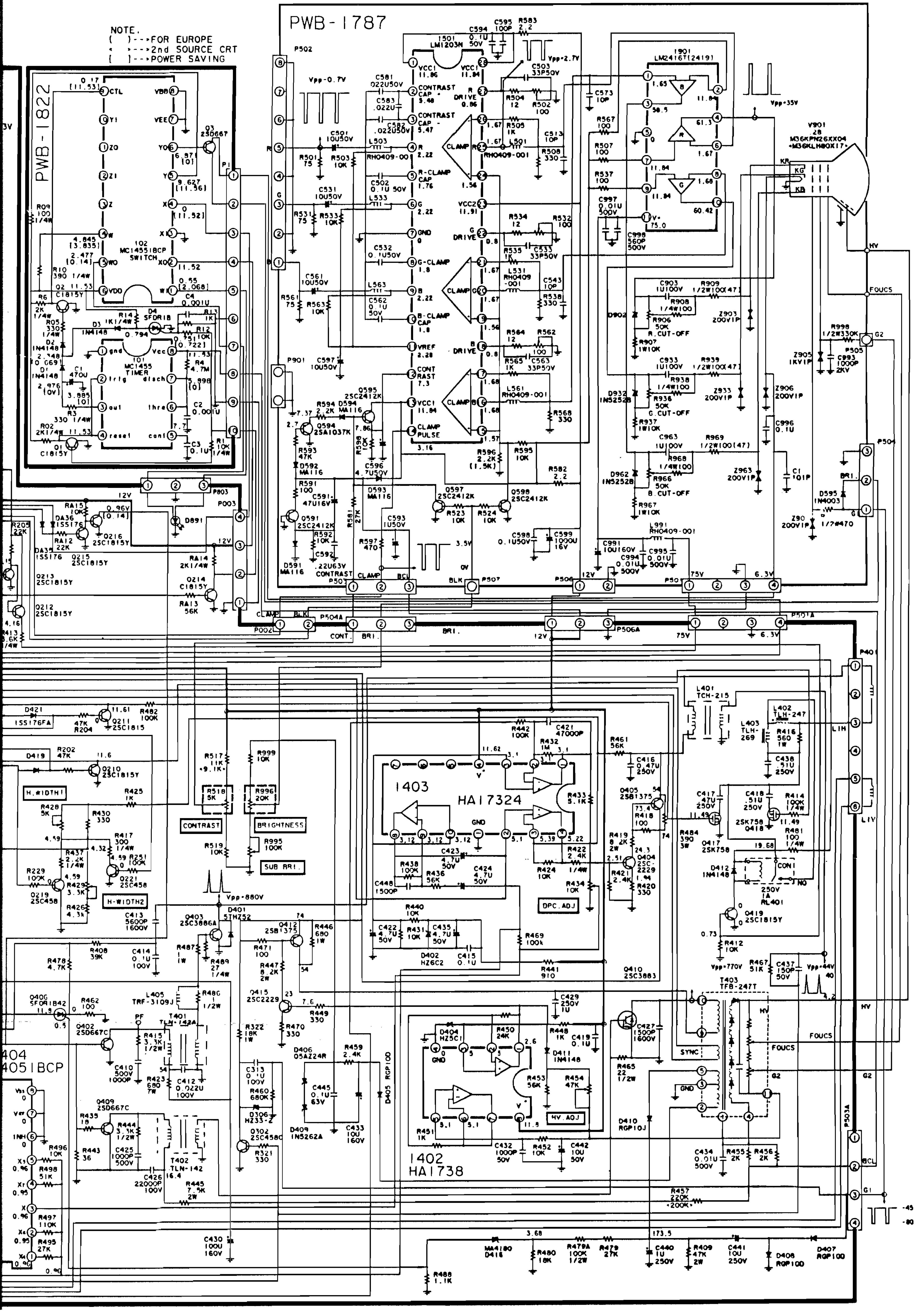
* PWB-1822 power saving is option.

11. COLOR MONITOR CIRCUIT DIAGRAM

MODEL NO: CM15VDE/VDR (Power Saving: Option)
PB8515SV/LR5A+

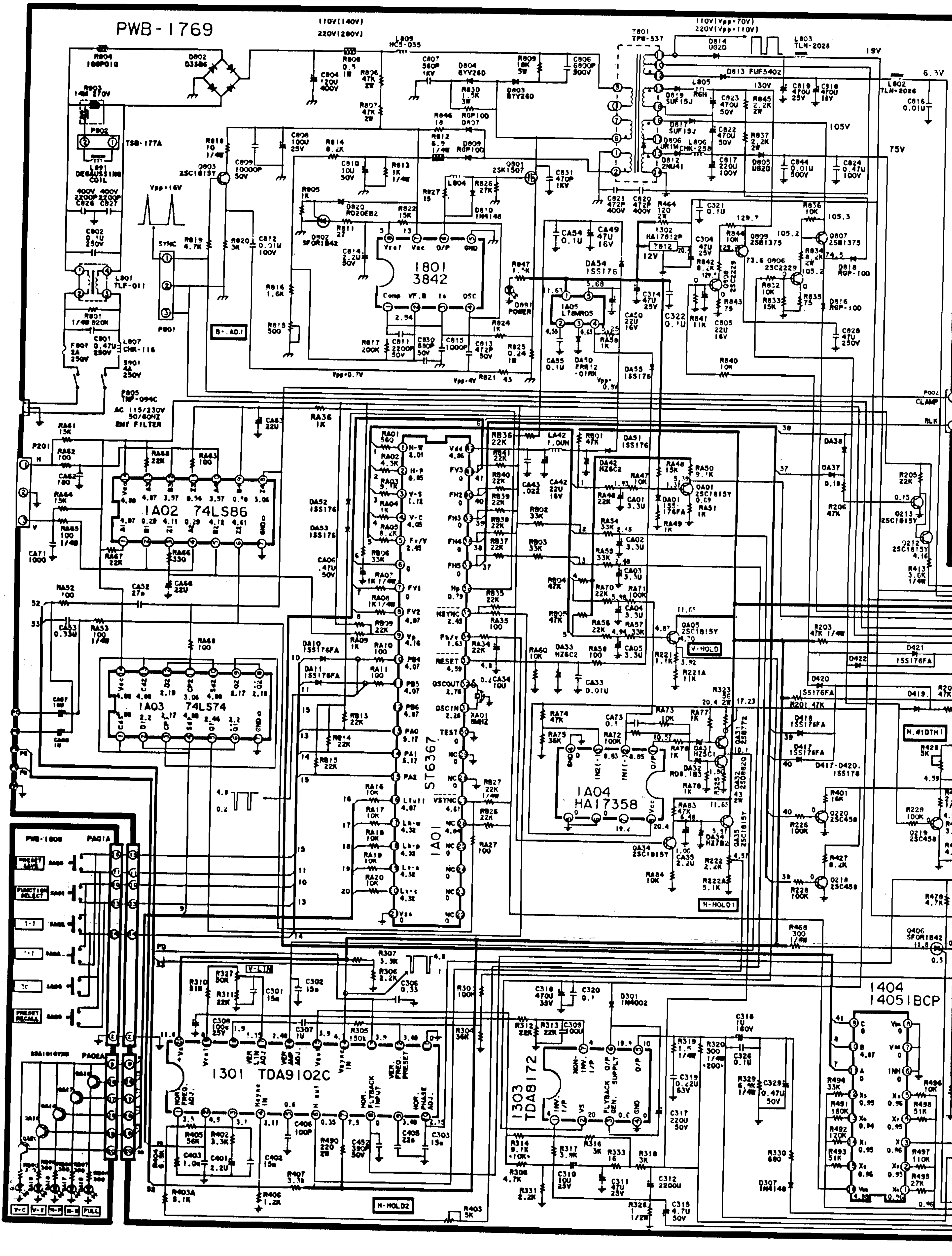


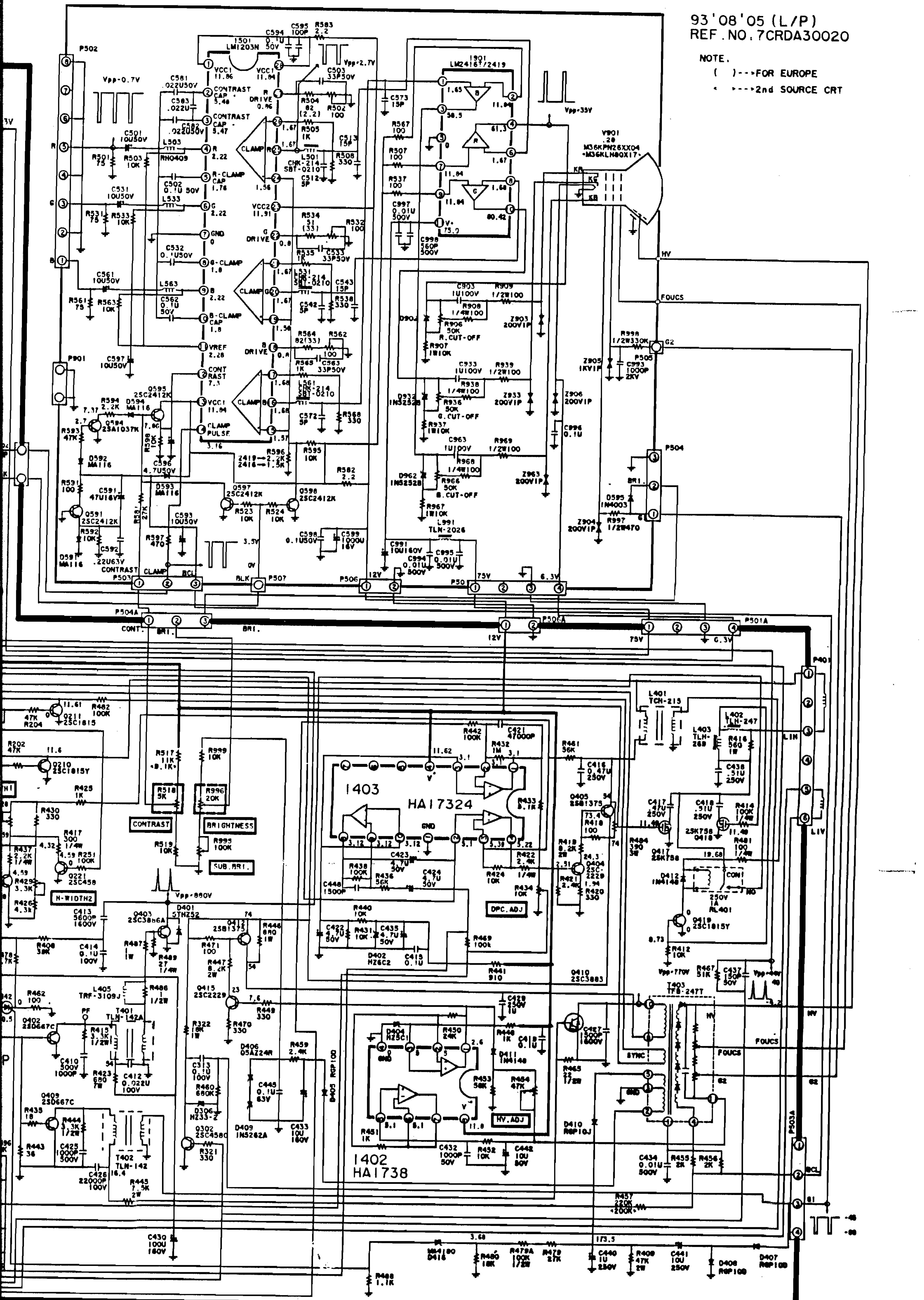
PWB-1769
PWB-1822
PWB-1808
110V(140V)
220V(280V)
110V(Vpp-70V)
220V(Vpp-110V)
T801 TPW-537
L809 HC5-035
D802 D3SB6
R804 10SP010
R803 14M 270V
L891 DEGAUSSING COIL
P802 TSB-177A
L801 TLF-011
R801 1/4W 820K
F801 2A 250V
C801 0.47U 250V
L807 CHK-116
S801 4A 250V
P805 TNF-094C
AC 115/230V 50/60HZ
EMI FILTER
Q803 2SC1815Y
Vpp-16V
SYNC
P801
B- ADJ
I801 3842
Vref
Vcc
O/P
GND
OSC
Q801 2SK1507
Q802 SFOR1842
D804 BYV26D
D803 BYV26D
D907 RGP10D
D909 RGP10D
D910 1N4148
D920 RD20EB2
D814 UG2D
D813 FUF5402
D819
L805
SUF15J
D817 SUF15J
D806
D812 2NU41
L803 TLN-2026
L802 TLN-2026
19V
6.3V
130V
105V
75V
I302 HA17812P
12V
Q807 2SB1375
Q809 2SB1375
Q806 2SC2229
Q808 2SC2229
D818 RGP-100
D816 RGP-100
IA05 L78MR05
DA54 1SS176
DA55 1SS176
DA50 ERB12-01RK
Vpp-0.7V
Vpp-4V
Vpp-0.5V
P201
H
V
IA02 74LS86
IA03 74LS74
IA01 ST6367
H-W
H-P
V-S
V-C
F+/V
FV1
FV2
PB4
PB5
PB6
PA0
PA1
PA2
Lt/Il
Lh-w
Lh-p
Lv-s
Lv-c
Vss
Vdd
FV3
FH2
FH3
FH4
FH5
Hp
HSYNC
Fh/v
RESET
OSCOUT
OSCIN
TEST
VSYNC
NC
XA01 8MHZ
DA52 1SS176
DA53 1SS176
DA10 1SS176FA
DA11 1SS176FA
DA51 1SS176
DA42 HZ6C2
DA33 HZ6C2
QA01 2SC1815Y
QA05 2SC1815Y
QA34 2SC1815Y
QA35 2SC1815Y
QA31 HZ5C1
QA33 2SC2172
QA32 2SD8820
DA34 HZ7B2
V-HOLD
H-HOLD1
H-HOLD2
IA04 HA17358
Q220 2SC458
Q218 2SC458
D418 1SS176FA
D417 1SS176FA
D420 1SS176FA
D421 1SS176FA
D417-D420
PRESET SAVE
FUNCTION SELECT
ZOOM
PRESET RECALL
SA00
SA01
SA02
SA03
SA04
SA05
PA01A
PA02A
QA16
QA17
QA18
QA19
QA20
2SA1015YX5
V-C
V-S
H-P
H-W
FULL
V-LIN
I301 TDA9102C
Vs
Vref
VER LIN ADJ.
VER AMP ADJ.
Vout
Vsync IN
VER. FREQ PRESET
HOR. FREQ ADJ.
Hsync IN
H out
HOR. FLYBACK INPUT
HOR. PHASE ADJ.
I303 TDA8172
NON-INV. I/P
O/P SUPPLY
O/P
INV. I/P
VS
FLYBACK GEN.
D301 1N4002
D307 1N4148
I404
I405


NOTE.
( )--->FOR EUROPE
< >--->2nd SOURCE CRT
[ ]--->POWER SAVING
PWB-1787
PWB-1822
I501 LM1203N
I901 LM2416T(2419)
I02 MC14551BCP SWITCH
I01 MC1455 TIMER
I403 HA17324
I402 HA1738
404 4051BCP
V901 28 M36KPN26XX04 <M36KLH80X17>
P502
P901
P1
P003
P002
P803
P504A
P506A
P501A
P503
P507
P506
P501
P401
P503A
P504
P505
T401 TLN-142A
T402 TLN-142
T403 TFB-247T
L401 TCH-215
L402 TLH-247
L403 TLH-269
L405 TRF-3109J
CONTRAST
BRIGHTNESS
SUB BRI.
H.WIDTH1
H-WIDTH2
DPC.ADJ
HV.ADJ
R.CUT-OFF
G.CUT-OFF
B.CUT-OFF
CLAMP
HV
FOUCS
G2
G1
BCL
SYNC
Vpp-0.7V
Vpp=2.7V
Vpp=35V
Vpp-880V
Vpp-770V
Vpp-44V
CONT.
BRI.
BLK
12V
75V
6.3V
3.5V
0V
-45
-80

COLOR MONITOR CIRCUIT DIAGRAM

MODEL NO: CM15VDS (Power Saving: Option)

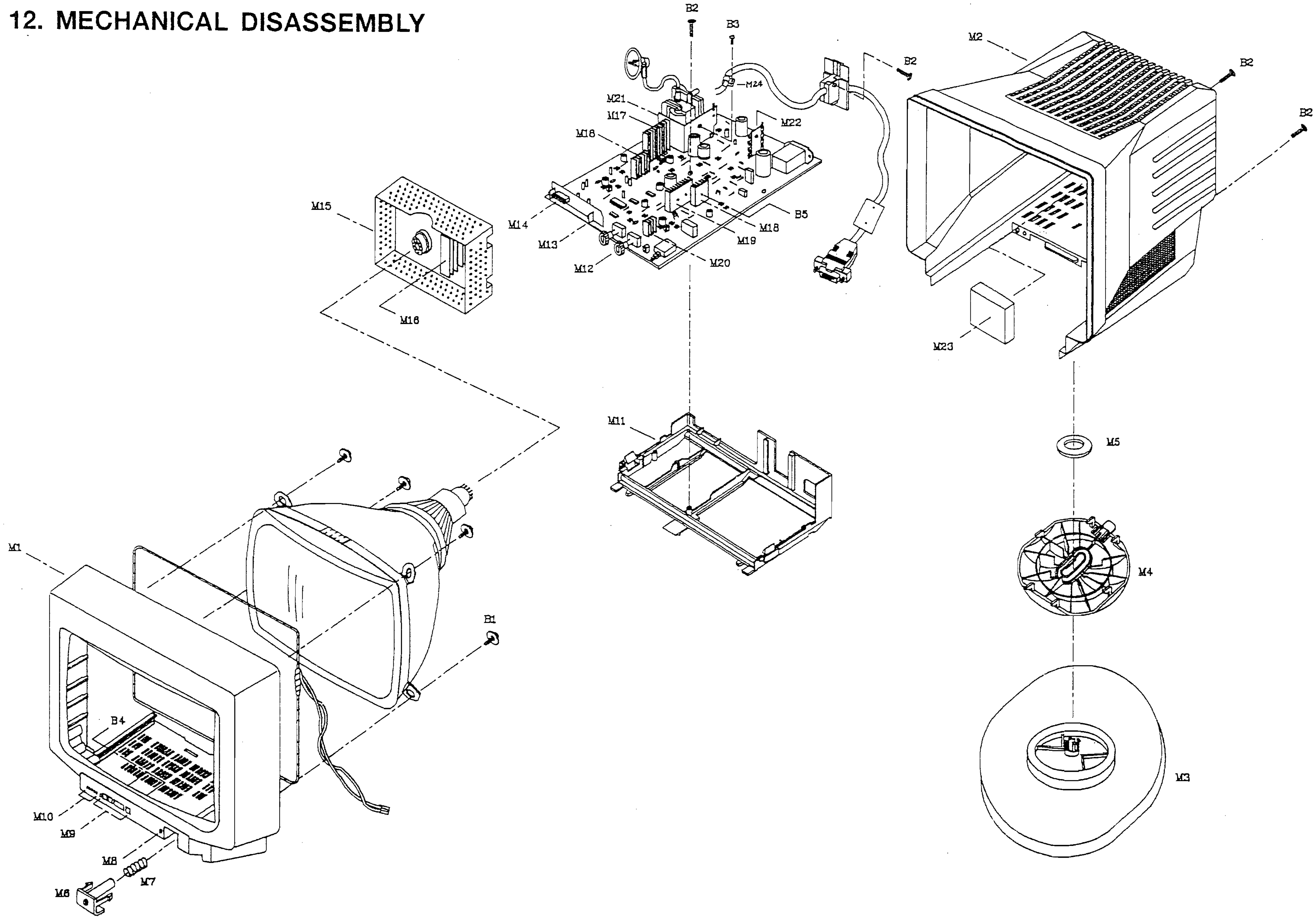

PWB-1769
110V(140V)
220V(280V)
T801 TPW-537
110V(Vpp-70V)
220V(Vpp-110V)
L803 TLN-2026
19V
6.3V
105V
75V
L802 TLN-2026
D802 D3SB6
L809 HC5-035
D813 FUF5402
D804 BYV26D
D803 BYV26D
P802 TSB-177A
L801 DEGAUSSING COIL
Q803 2SC1815Y
Q801 2SK1507
Q802 SFOR1842
1801 3842
Vref
Vcc
O/P
GND
Comp
VF.B
Is
OSC
Vpp-16V
SYNC
P801
B+ ADJ
L901 TLF-011
L807 CHK-116
F801 2A 250V
S901 4A 250V
P805 TNF-094C
AC 115/230V 50/60HZ
EMI FILTER
1302 HA17812P
12V
1A05 L78MR05
DA50 ERB12-01RK
DA54 1SS176
DA55 1SS176
D891 POWER
Q809 2SB1375
Q807 2SB1375
Q808 2SC2229
Q806 2SC2229
D818 RGP-100
D816 RGP-100
P201
1A02 74LS86
1A03 74LS74
1A01 ST6367
H-W
H-P
V-S
V-C
Fv/V
FV1
FV2
Vp
PB4
PB5
PB6
PA0
PA1
PA2
Lfull
Lh-w
Lh-p
Lv-s
Lv-c
Vss
Vdd
FV3
FH2
FH3
FH4
FH5
Hp
HSYNC
Fh/v
RESET
OSCOUT
OSCIN
TEST
VSYNC
XA01 8MHZ
LA42 1.0UH
DA42 HZ6C2
DA01 1SS176FA
QA01 2SC1815Y
QA05 2SC1815Y
V-HOLD
DA33 HZ6C2
1A04 HA17358
QA31 2SB772
QA32 2SD882
QA33 2SC1815Y
QA34 2SC1815Y
DA34 HZ7B2
DA31 HZ5C1
H-HOLD1
H-WIDTH
CLAMP
BLK
Q213 2SC1815Y
Q212 2SC1815Y
D421 1SS176FA
D417-D420 1SS176
Q220 2SC458
Q219 2SC458
Q218 2SC458
Q406 SFOR1842
1404 1405 1BCP
PWB-1808
PA01A
PRESET SAVE
FUNCTION SELECT
(-)
(+)
RC
PRESET RECALL
PA02A
V-C
V-S
H-P
H-W
FULL
V-LIN
1301 TDA9102C
VER. LIN ADJ
VER. AMP ADJ
VER. FREQ. ADJ
HOR. FREQ. ADJ
Hsync IN
Vsync IN
HOR. FLYBACK INPUT
HOR. PHASE ADJ
H-HOLD2
1303 TDA8172
D301 1N4002
D307 1N4148
NON-INV. I/P
INV. I/P
FLYBACK GEN.
O/P SUPPLY
O/P
GND


P502
I501
LM1203N
I901
LM2416T/2419
V901
M36KPN26XX04
<M36KLN80X17>
P901
P503
P507
P506
P505
P504
P504A
P506A
P501A
P401
P503A
CONTRAST
BRIGHTNESS
SUB.BRI.
H-WIDTH2
I403
HA17324
DPC.ADJ
I402
HA1738
HV.ADJ
T401
TLN-142A
T402
TLN-142
T403
TFB-247T
L401
TCH-215
L402
TLN-247
L403
TLN-268
RL401
R.CUT-OFF
G.CUT-OFF
B.CUT-OFF
HV
FOUCS
G2
LIN
LIV
SYNC

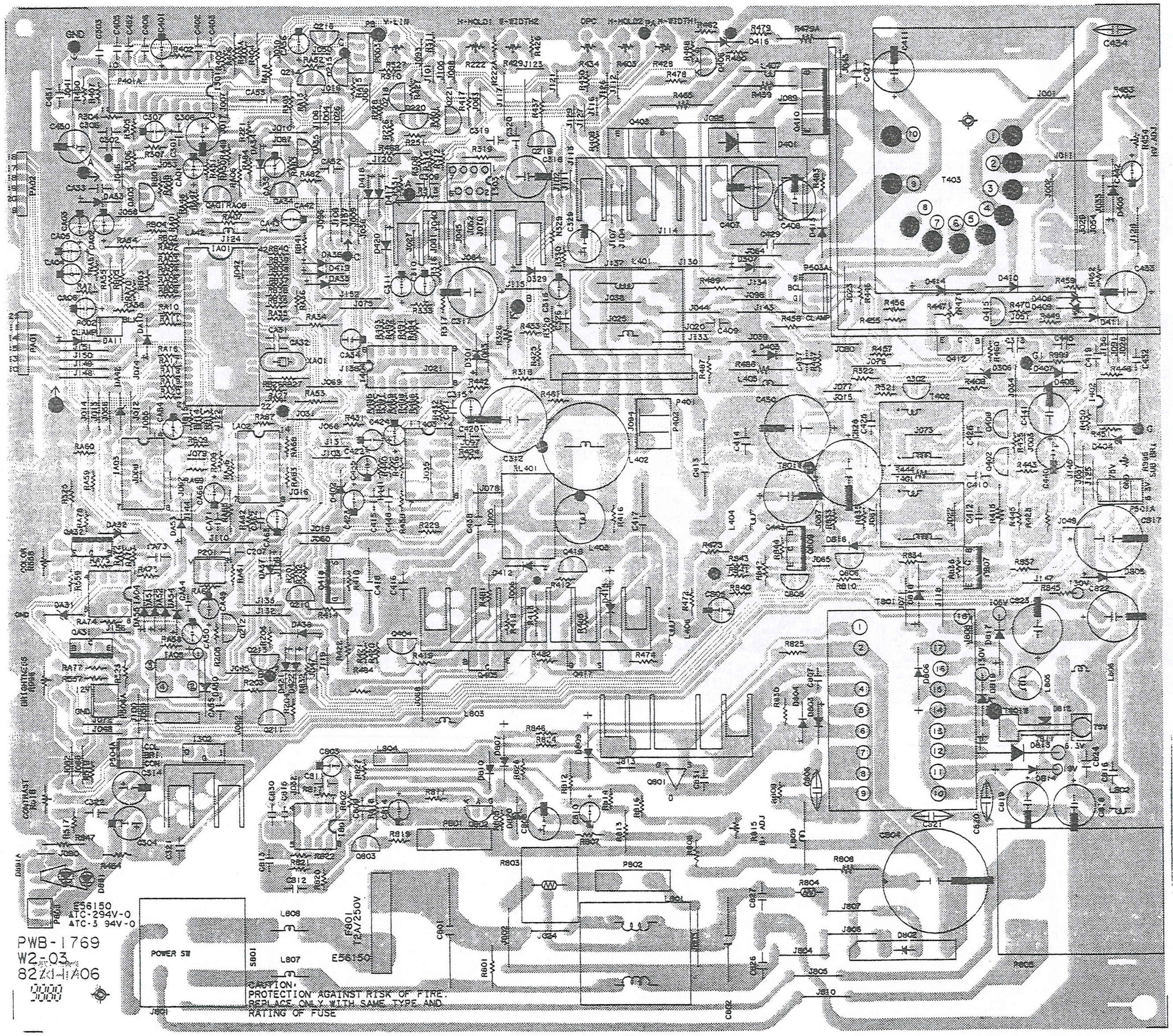
93'08'05 (L/P)
REF.NO.7CRDA30020

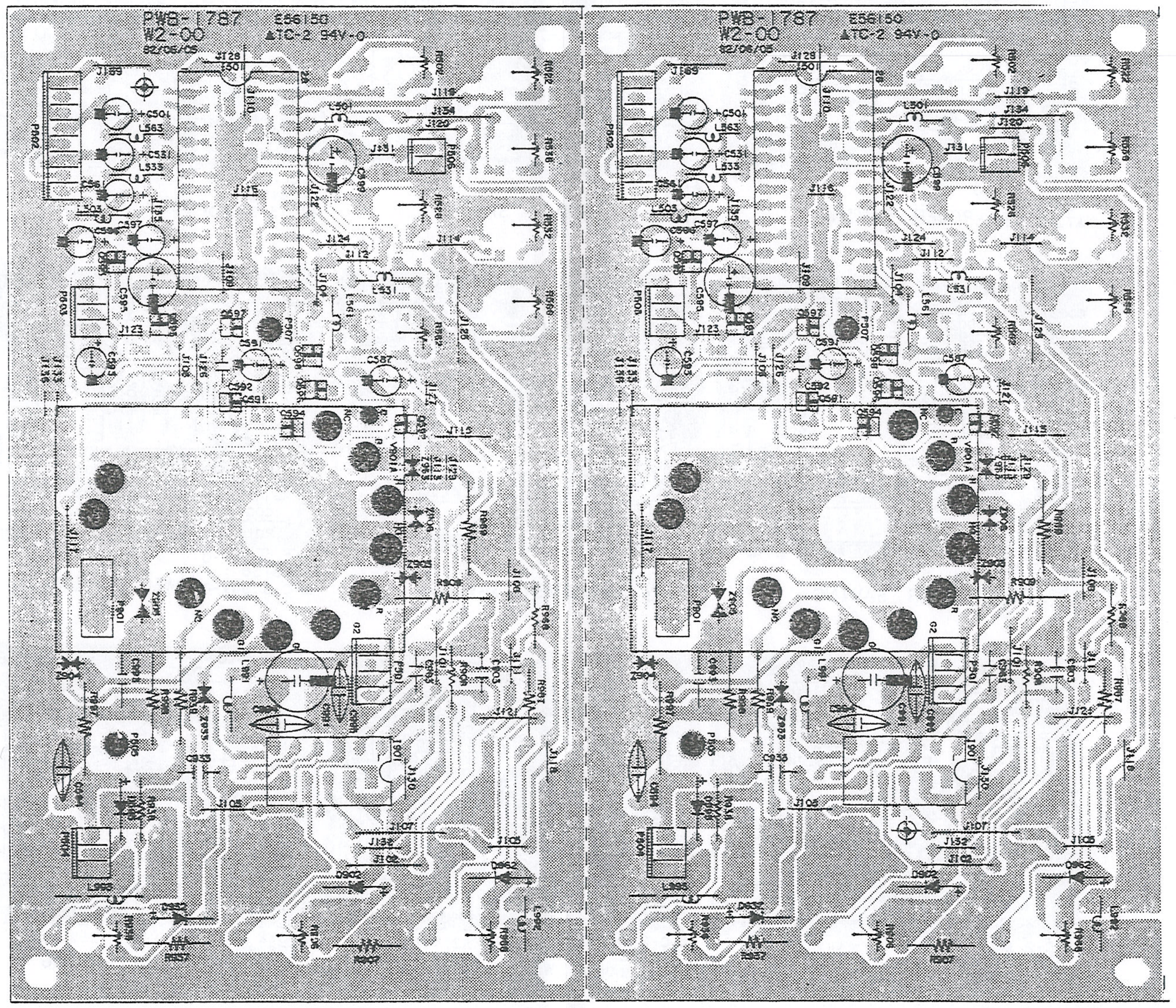
NOTE.
( )--->FOR EUROPE
< >--->2nd SOURCE CRT

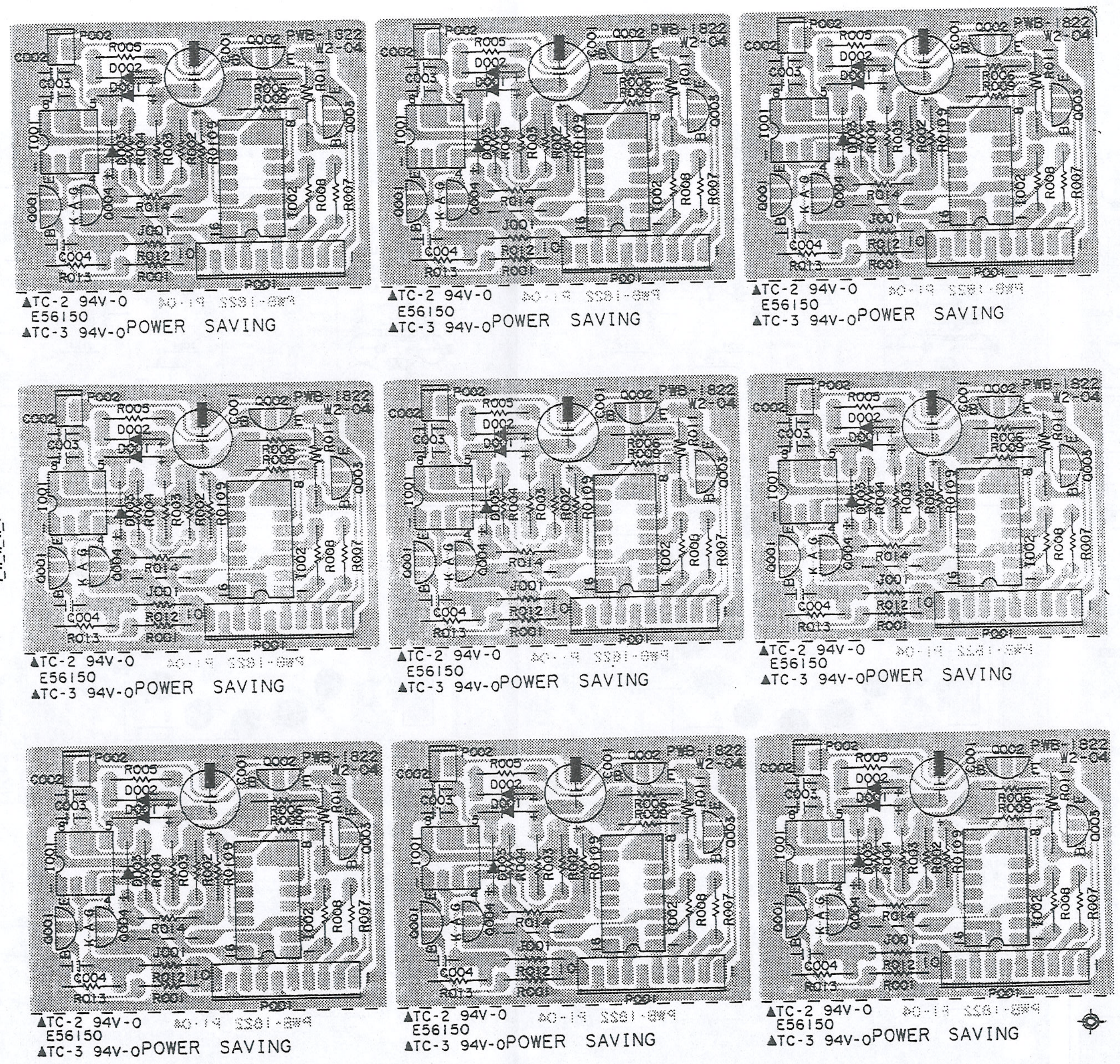
12. MECHANICAL DISASSEMBLY

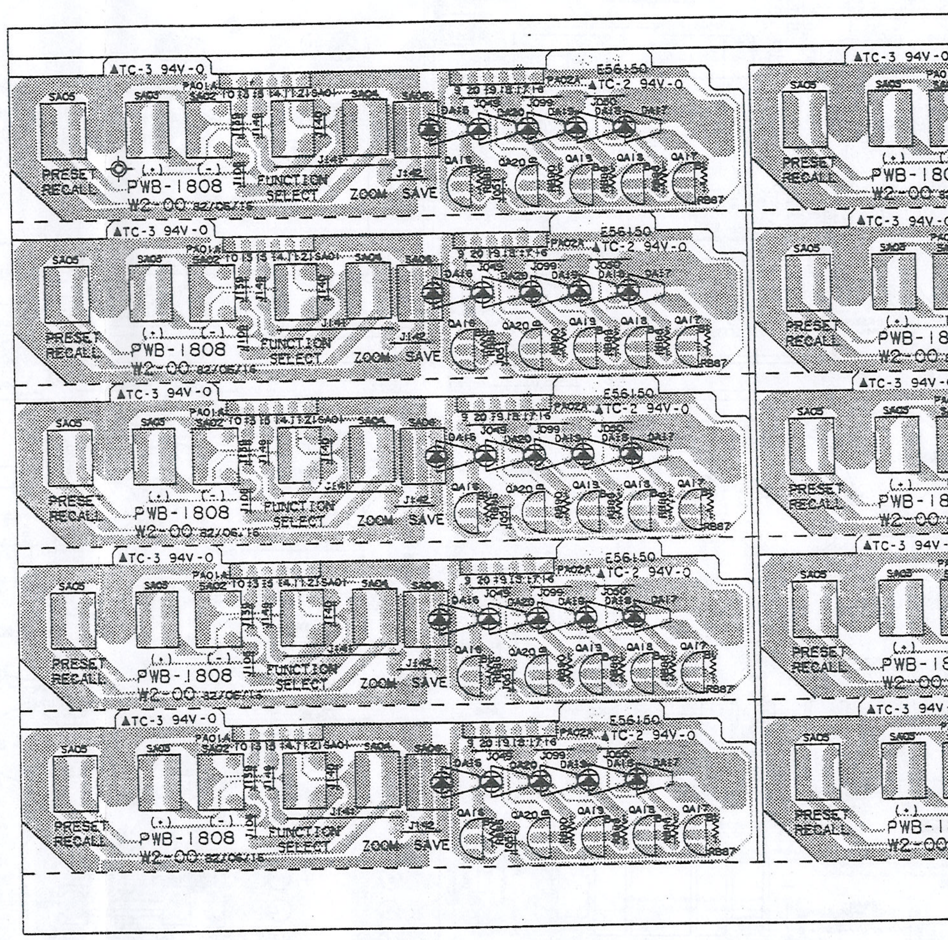

B2
B3
M24
M21
M17
M16
M22
B2
M2
B2
B2
M15
M14
M13
M12
M20
M19
M18
B5
M16
M23
M11
M5
M4
M3
M1
B1
B4
M10
M9
M8
M7
M6

10. PCB LAYOUT


GND
H-LIN
H-HOLD1
S-WIDTH2
OPC
H-HOLD2
H-WIDTH1
CLAMP
COLOR
TINT
BRIGHTNESS
CONTRAST
E56150
ATC-294V-0
ATC-3 94V-0
PWB-1769
W2-03
82/04/06
POWER SW
S801
L808
L807
F801
T2A/250V
CAUTION:
PROTECTION AGAINST RISK OF FIRE.
REPLACE ONLY WITH SAME TYPE AND
RATING OF FUSE
J801


PWB-1787
E56150
W2-00
ATC-2 94V-0
82/06/05
PWB-1787
E56150
W2-00
ATC-2 94V-0
82/06/05


PWB-1822
W2-04
▲TC-2 94V-0
E56150
▲TC-3 94V-0
POWER SAVING
P002
R005
D002
D001
Q002
C001
C002
C003
I001
Q001
Q003
C004
J001
R012
R013
R014
R001
R007
R008
R010
P001
IC


▲TC-3 94V-0
▲TC-2 94V-0
E56150
PWB-1808
W2-00 82/06/16
PRESET RECALL
FUNCTION SELECT
ZOOM
SAVE
SA05
SA03
SA02
SA01
SA04
PA01A
PA02A
J141
J142
(+)
(-)